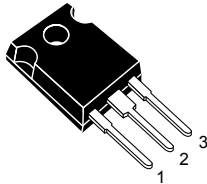
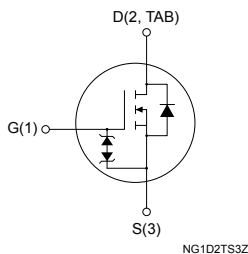


N-channel 950 V, 110 mΩ typ., 38 A MDmesh K5 Power MOSFET in a TO-247 package


TO-247


Features

Order code	V_{DS}	$R_{DS(on)}$ max.	I_D
STW40N95K5	950 V	130 mΩ	38 A

- Ultra-low gate charge
- Very low FoM (figure of merit)
- Zener-protected
- 100% avalanche tested

Applications

- Switching applications

Description

This very high voltage N-channel Power MOSFET is designed using MDmesh K5 technology based on an innovative proprietary vertical structure. The result is a dramatic reduction in on-resistance and ultra-low gate charge for applications requiring superior power density and high efficiency.



Product status link

[STW40N95K5](#)

Product summary

Order code	STW40N95K5
Marking	40N95K5
Package	TO-247
Packing	Tube

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{GS}	Gate-source voltage	± 30	V
I_D	Drain current (continuous) at $T_C = 25\text{ }^{\circ}\text{C}$	38	A
	Drain current (continuous) at $T_C = 100\text{ }^{\circ}\text{C}$	24	
$I_{DM}^{(1)}$	Drain current (pulsed)	152	A
P_{TOT}	Total power dissipation at $T_C = 25\text{ }^{\circ}\text{C}$	450	W
$dv/dt^{(2)}$	Peak diode recovery voltage slope	4.5	V/ns
$dv/dt^{(3)}$	MOSFET dv/dt ruggedness	50	V/ns
T_{stg}	Storage temperature range	-55 to 150	$^{\circ}\text{C}$
T_J	Operating junction temperature range		$^{\circ}\text{C}$

1. Pulse width limited by safe operating area.
2. $I_{SD} \leq 19\text{ A}$, $V_{DS} (\text{peak}) < V_{(BR)DSS}$, $di/dt = 100\text{ A}/\mu\text{s}$.
3. $V_{DD} = 760\text{ V}$.

Table 2. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance, junction-to-case	0.28	$^{\circ}\text{C}/\text{W}$
R_{thJA}	Thermal resistance, junction-to-ambient	50	$^{\circ}\text{C}/\text{W}$

Table 3. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or not repetitive (pulse width limited by T_J max.)	13	A
E_{AS}	Single pulse avalanche energy (starting $T_J = 25\text{ }^{\circ}\text{C}$, $I_D = I_{AR}$, $V_{DD} = 50\text{ V}$)	700	mJ

2 Electrical characteristics

$T_C = 25\text{ °C}$ unless otherwise specified.

Table 4. On/off-states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}$, $I_D = 1\text{ mA}$	950			V
I_{DSS}	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$, $V_{DS} = 950\text{ V}$			1	μA
		$V_{GS} = 0\text{ V}$, $V_{DS} = 950\text{ V}$, $T_C = 125\text{ °C}$ ⁽¹⁾			50	
I_{GSS}	Gate-body leakage current	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$			± 10	μA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 100\text{ }\mu\text{A}$	3	4	5	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$, $I_D = 19\text{ A}$		110	130	m Ω

1. Specified by design, not tested in production.

Table 5. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 100\text{ V}$, $f = 1\text{ kHz}$, $V_{GS} = 0\text{ V}$	-	3300	-	pF
C_{oss}	Output capacitance		-	250	-	pF
C_{rss}	Reverse transfer capacitance		-	2	-	pF
$C_{o(tr)}^{(1)}$	Equivalent capacitance, time-related	$V_{DS} = 0\text{ to }760\text{ V}$, $V_{GS} = 0\text{ V}$	-	398	-	pF
$C_{o(er)}^{(2)}$	Equivalent capacitance, energy-related		-	142	-	pF
R_g	Intrinsic gate resistance	$f = 1\text{ MHz}$, $I_D = 0\text{ A}$	-	5	-	Ω
Q_g	Total gate charge	$V_{DD} = 760\text{ V}$, $I_D = 38\text{ A}$, $V_{GS} = 0\text{ to }10\text{ V}$ (see Figure 15. Test circuit for gate charge behavior)	-	93	-	nC
Q_{gs}	Gate-source charge		-	18.7	-	nC
Q_{gd}	Gate-drain charge		-	63.4	-	nC

1. $C_{o(tr)}$ is a constant capacitance value that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS} .

2. $C_{o(er)}$ is a constant capacitance value that gives the same stored energy as C_{oss} while V_{DS} is rising 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	$V_{DD} = 475\text{ V}$, $I_D = 19\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$	-	33.5	-	ns
t_r	Rise time		-	51	-	ns
$t_{d(off)}$	Turn-off delay time	(see Figure 14. Test circuit for resistive load switching times and Figure 19. Switching time waveform)	-	91.5	-	ns
t_f	Fall time		-	10	-	ns

Table 7. Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		38	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		152	A
$V_{SD}^{(2)}$	Forward on voltage	$V_{GS} = 0\text{ V}$, $I_{SD} = 38\text{ A}$	-		1.5	V
t_{rr}	Reverse recovery time	$I_{SD} = 38\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$,	-	706		ns
Q_{rr}	Reverse recovery charge	$V_{DD} = 60\text{ V}$ (see Figure 16. Test circuit for inductive load switching and diode recovery times)	-	22		μC
I_{RRM}	Reverse recovery current		-	62		A
t_{rr}	Reverse recovery time	$I_{SD} = 38\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$,	-	886		ns
Q_{rr}	Reverse recovery charge	$V_{DD} = 60\text{ V}$, $T_J = 150\text{ }^\circ\text{C}$	-	28.2		μC
I_{RRM}	Reverse recovery current	(see Figure 16. Test circuit for inductive load switching and diode recovery times)	-	64		A

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

2.1 Electrical characteristics (curves)

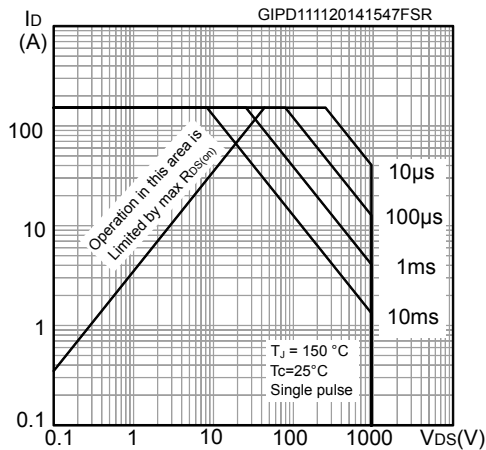
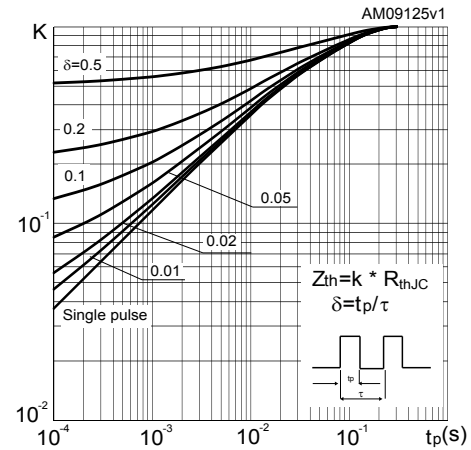
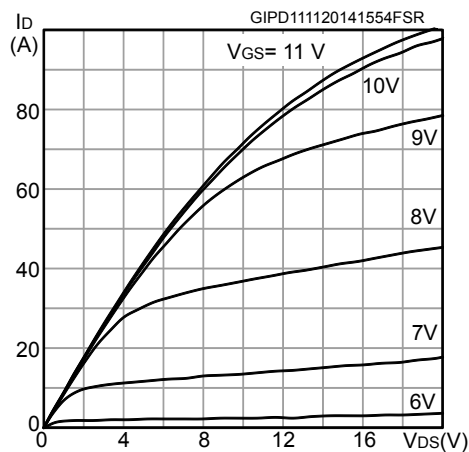
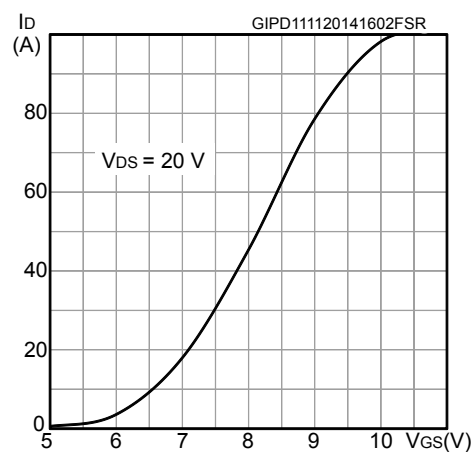
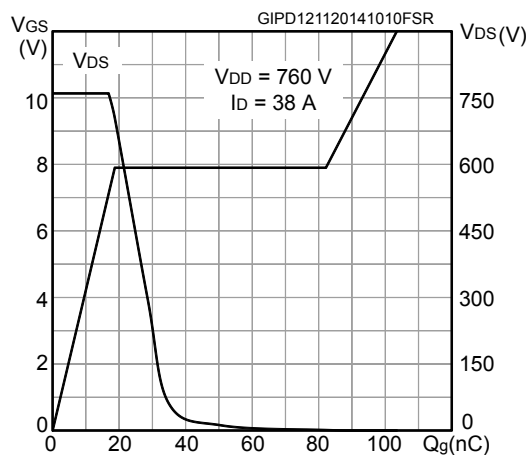
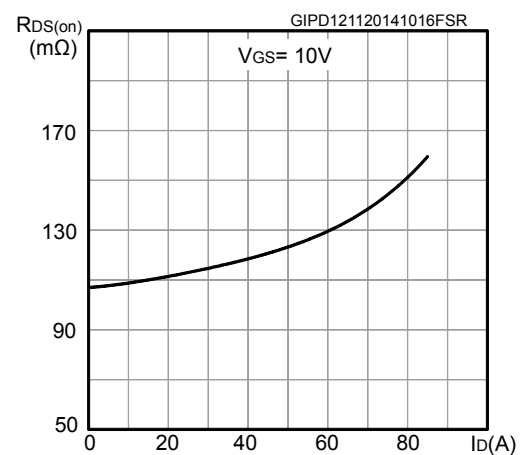
Figure 1. Safe operating area

Figure 2. Normalized transient thermal impedance

Figure 3. Typical output characteristics

Figure 4. Typical transfer characteristics

Figure 5. Typical gate charge characteristics

Figure 6. Typical drain-source on-resistance


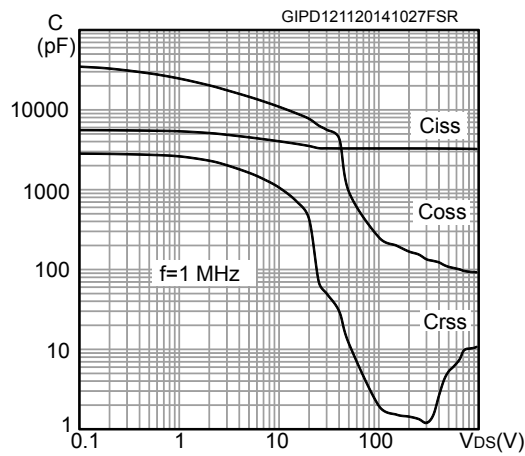
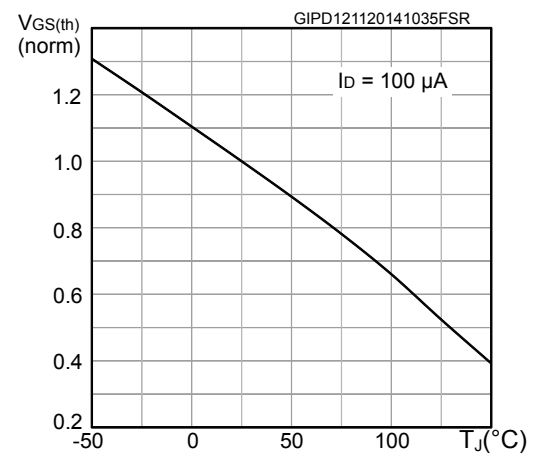
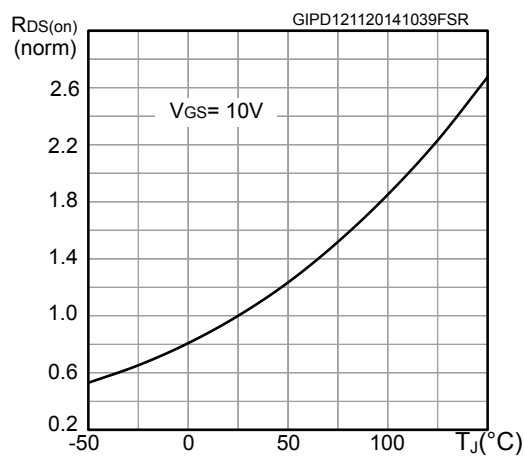
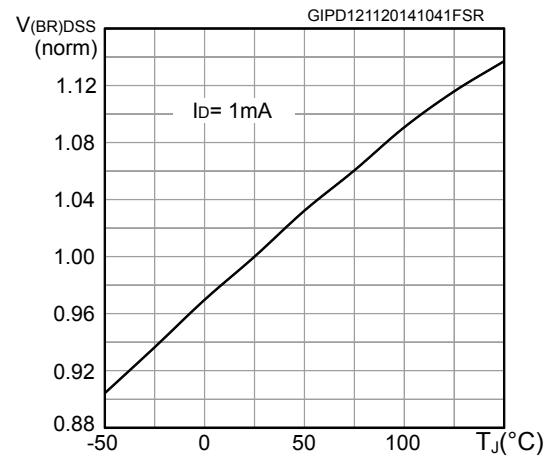
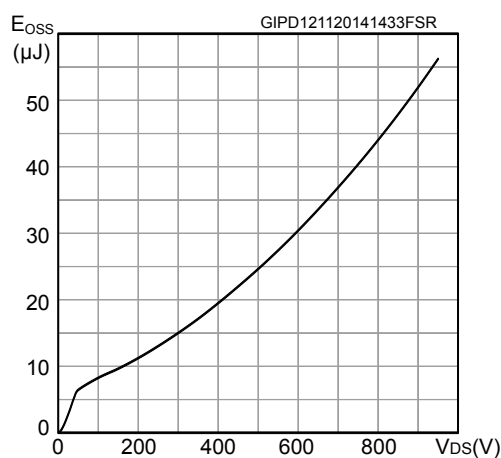
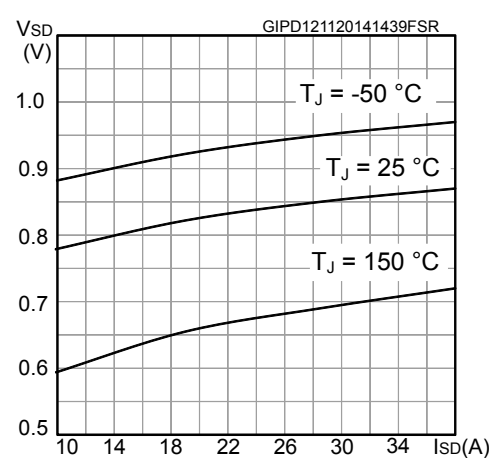
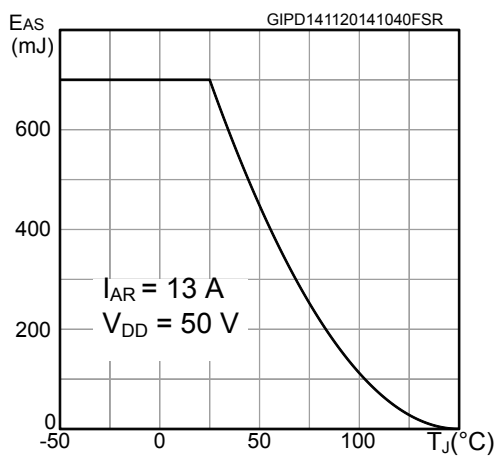
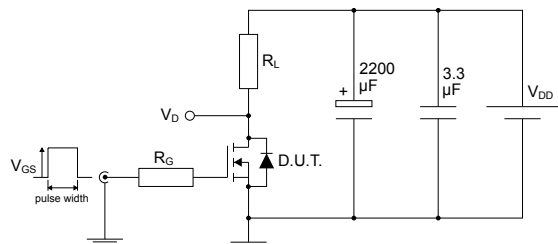
Figure 7. Typical capacitance characteristics

Figure 8. Normalized gate threshold vs temperature

Figure 9. Normalized on-resistance vs temperature

Figure 10. Normalized breakdown voltage vs temperature

Figure 11. Typical output capacitance stored energy

Figure 12. Typical reverse diode forward characteristics


Figure 13. Maximum avalanche energy vs temperature



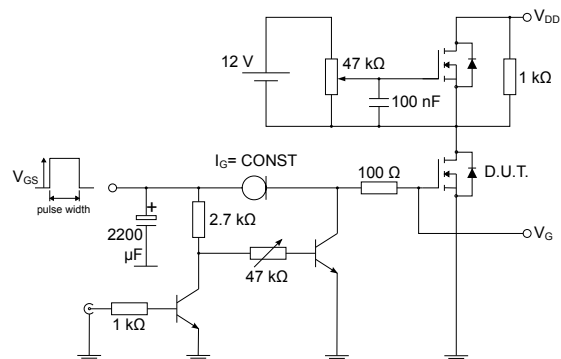
3 Test circuits

Figure 14. Test circuit for resistive load switching times



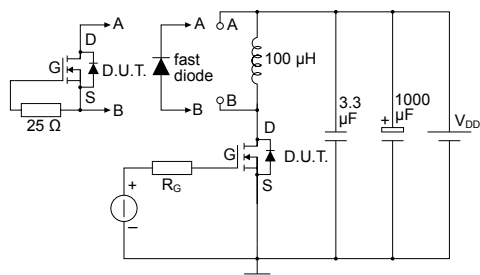
AM01468v1

Figure 15. Test circuit for gate charge behavior



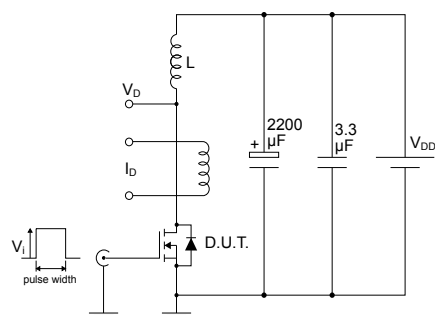
AM01469v1

Figure 16. Test circuit for inductive load switching and diode recovery times



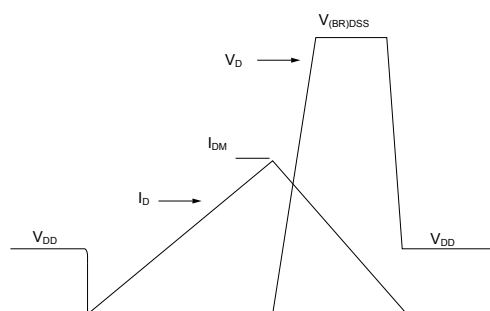
AM01470v1

Figure 17. Unclamped inductive load test circuit



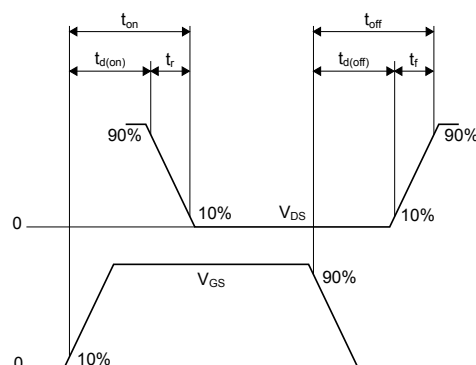
AM01471v1

Figure 18. Unclamped inductive waveform



AM01472v1

Figure 19. Switching time waveform



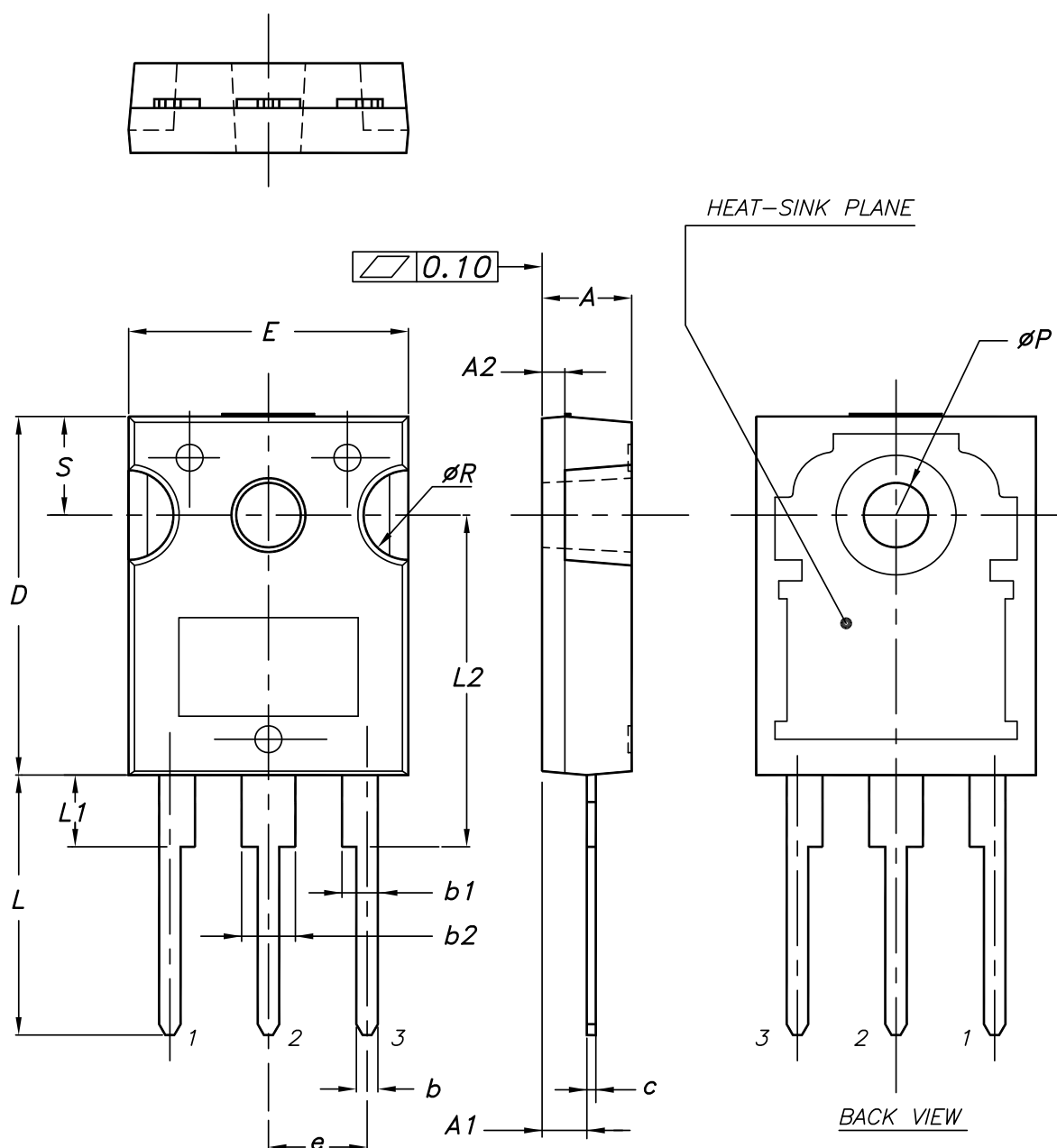
AM01473v1

4 Package information

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 TO-247 package information

Figure 20. TO-247 package outline



0075325_11

Table 8. TO-247 package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.85		5.15
A1	2.20		2.60
A2		1.27	
b	1.0		1.40
b1	2.0		2.40
b2	3.0		3.40
c	0.40		0.80
D	19.85		20.15
E	15.45		15.75
e	5.30	5.45	5.60
L	14.20		14.80
L1	3.70		4.30
L2		18.50	
ØP	3.55		3.65
ØR	4.50		5.50
S	5.30	5.50	5.70

Revision history

Table 9. Document revision history

Date	Revision	Changes
03-Jun-2014	1	First release.
14-Nov-2014	2	Document status promoted from preliminary to production data. Added <i>Section 2.1: "Electrical characteristics (curves)"</i> .
09-Apr-2026	3	Updated Section 4.1: TO-247 package information . Minor text changes.

IMPORTANT NOTICE – READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice.

In the event of any conflict between the provisions of this document and the provisions of any contractual arrangement in force between the purchasers and ST, the provisions of such contractual arrangement shall prevail.

The purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgment.

The purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of the purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

If the purchasers identify an ST product that meets their functional and performance requirements but that is not designated for the purchasers' market segment, the purchasers shall contact ST for more information.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, refer to www.st.com/trademarks. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2026 STMicroelectronics – All rights reserved