Contents

Downloaded from Arrow.com.

1 Electrical ratings

Table 2: Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	300	V
V_{GS}	Gate-source voltage	±20	V
I_D	Drain current (continuous) at T_C = 25 °C	60	A
I_D	Drain current (continuous) at T_C= 100 °C	37.8	A
I_{DM} (1)	Drain current (pulsed)	240	A
P_{TOT}	Total dissipation at T_C = 25 °C	320	W
dv/dt (2)	Peak diode recovery voltage slope	12	V/ns
T_{stg}	Storage temperature range	- 55 to 150	°C
T_j	Operating junction temperature range		

Notes:

(1)Pulse width limited by safe operating area.

(2) I_{SD} ≤ 60 A, di/dt ≤ 200 A/µs; V_{DD} ≤ 80% $V_{(BR)DSS}$

Table 3: Thermal data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case	0.39	°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient	50	°C/W

Table 4: Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or non- repetitive (pulse width limited by $T_{jmax.}$)	50	A
E_{AS}	Single pulse avalanche energy (starting T_j = 25 °C, I_D = I_{AR}, V_{DD} = 50 V)	400	mJ

Downloaded from Arrow.com.

2 Electrical characteristics

(T_C= 25 °C unless otherwise specified)

Table 5: 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	300			V
I_{DSS}	Zero-gate voltage drain current	V_{GS} = 0 V, V_{DS} = 300 V			1	µA
		V_{GS} = 0 V, V_{DS} = 300 V, T_C = 125 °C (1)			10	µA
I_{GSS}	Gate-body leakage current	V_{DS} = 0 V, V_{GS} = ±25 V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 250 µA	2	3	4	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS} = 10 V, I_D = 30 A		35	45	mΩ

Notes:

(1)Defined by design, not subject to production test.

Table 6: Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{DS} = 25 V, f = 1 MHz, V_{GS} = 0 V	-	5930	-	pF
C_{oss}	Output capacitance		-	837	-	pF
C_{rss}	Reverse transfer capacitance		-	110	-	pF
$C_{oss\ eq.}$ (1)	Equivalent output capacitance	V_{DS} = 0 V to 240 V, V_{GS} = 0 V	-	462	-	pF
R_G	Intrinsic gate resistance	f = 1 MHz, I_D=0 A	-	1.55	-	Ω
Q_g	Total gate charge	V_{DD} = 240 V, I_D = 60 A, V_{GS} = 0 to 10 V (see *Figure 15: "Test circuit for gate charge behavior"*)	-	164	-	nC
Q_{gs}	Gate-source charge		-	36	-	nC
Q_{gd}	Gate-drain charge		-	69	-	nC

Notes:

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

Table 7: Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	V_{DD} = 150 V, I_D = 30 A R_G = 4.7 Ω, V_{GS} = 10 V (see *Figure 14: "Test circuit for resistive load switching times"* and *Figure 19: "Switching time waveform"*)	-	115	-	ns
t_r	Rise time		-	87	-	ns
$t_{d(off)}$	Turn-off-delay time		-	141	-	ns
t_f	Fall time		-	101	-	ns

Downloaded from Arrow.com.

Table 8: Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		60	A
I_{SDM} (1)	Source-drain current (pulsed)		-		240	A
V_{SD} (2)	Forward on voltage	V_{GS} = 0 V, I_{SD} = 60 A	-		1.6	V
t_{rr}	Reverse recovery time	I_{SD} = 60 A, di/dt = 100 A/µs, V_{DD} = 60 V (see *Figure 16: "Test circuit for inductive load switching and diode recovery times"*)	-	252		ns
Q_{rr}	Reverse recovery charge		-	2.5		µC
I_{RRM}	Reverse recovery current		-	20		A
t_{rr}	Reverse recovery time	I_{SD} = 60 A, di/dt = 100 A/µs, V_{DD} = 60 V, T_j = 150 °C (see *Figure 16: "Test circuit for inductive load switching and diode recovery times"*)	-	316		ns
Q_{rr}	Reverse recovery charge		-	3.7		µC
I_{RRM}	Reverse recovery current		-	23.2		A

Notes:

(1)Pulse width is limited by safe operating area.

(2)Pulse test: pulse duration = 300 µs, duty cycle 1.5%.

Downloaded from Arrow.com.

2.1 Electrical characteristics (curves)

Figure 2: Safe operating area

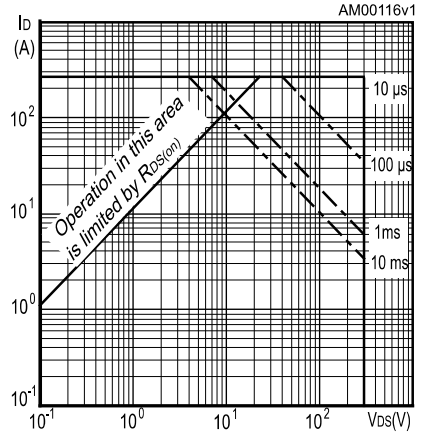


Figure 3: Thermal impedance

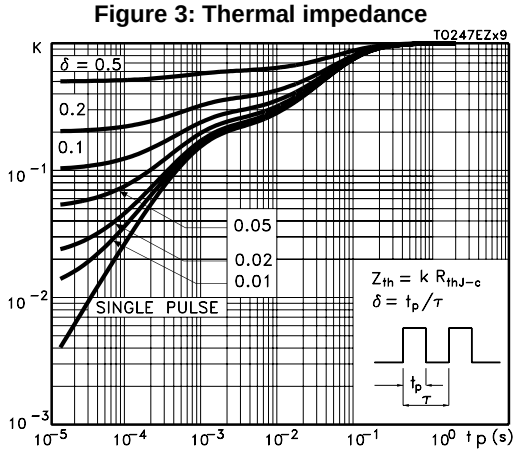


Figure 4: Output characteristics

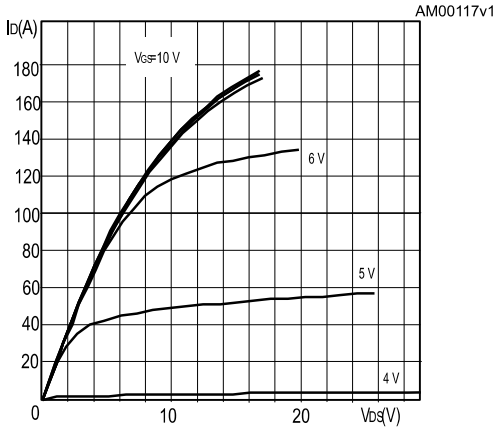


Figure 5: Transfer characteristics

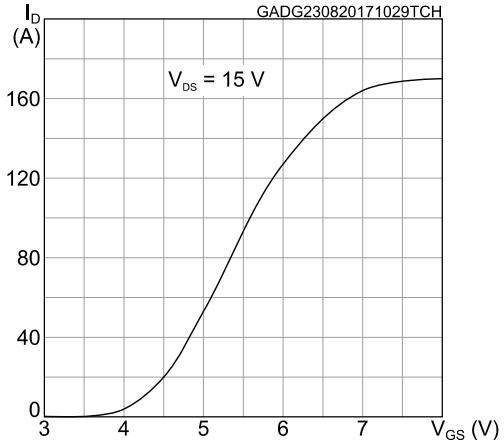


Figure 6: Gate charge vs. gate-source voltage

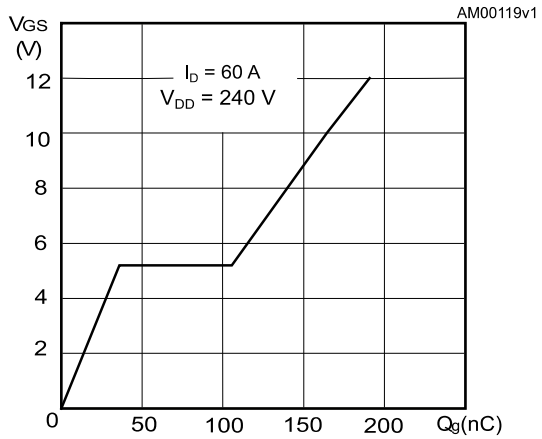
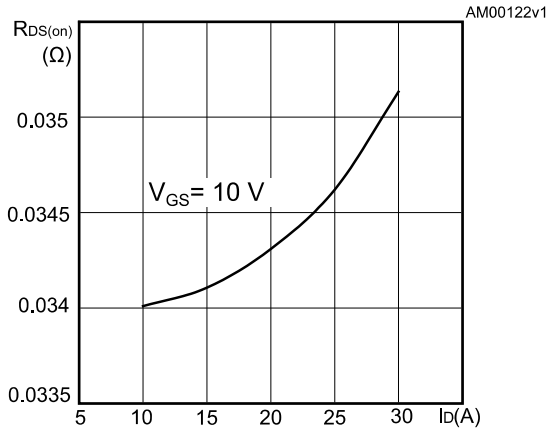


Figure 7: Static drain-source on-resistance



Downloaded from Arrow.com.

Figure 8: Capacitance variations

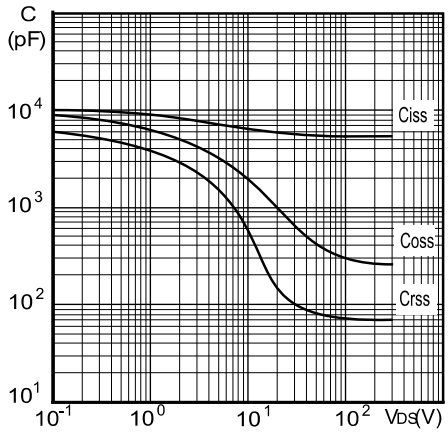


Figure 9: Normalized gate threshold voltage vs temperature

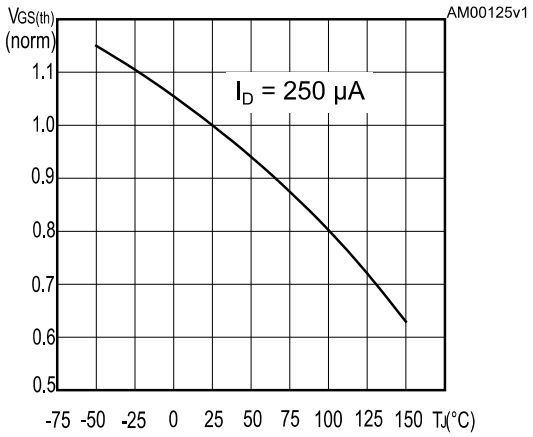


Figure 10: Normalized on-resistance vs temperature

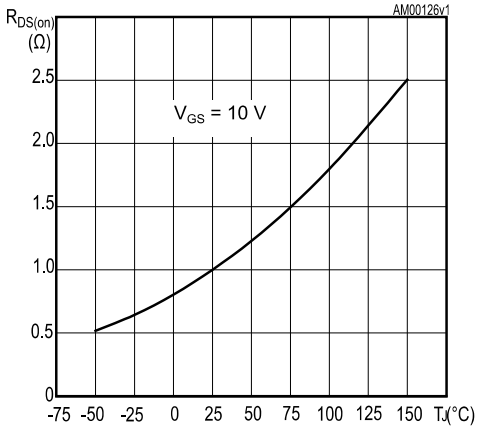


Figure 11: Normalized V(BR)DSS vs temperature

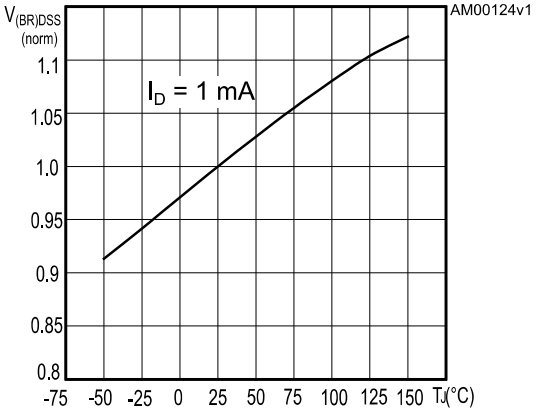


Figure 12: Maximum avalanche energy vs temperature

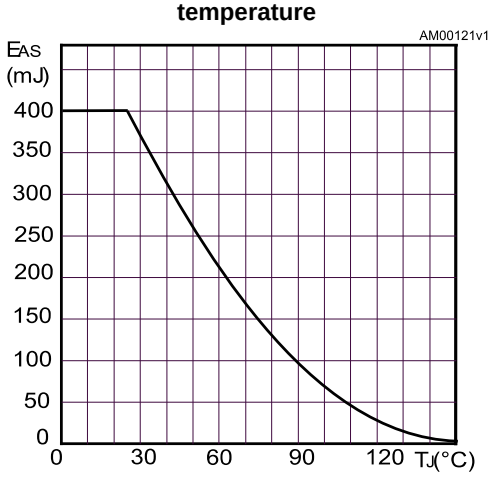
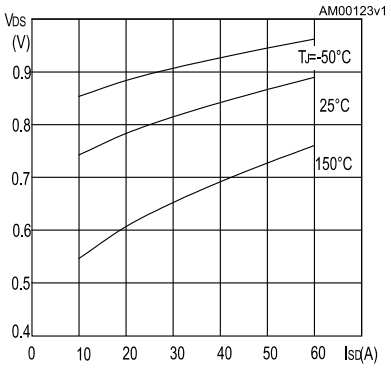


Figure 13: Source-drain diode forward characteristics



Downloaded from Arrow.com.

3 Test circuits

Figure 14: Test circuit for resistive load switching times

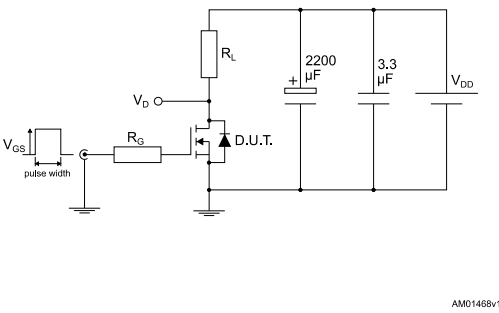


Figure 15: Test circuit for gate charge behavior

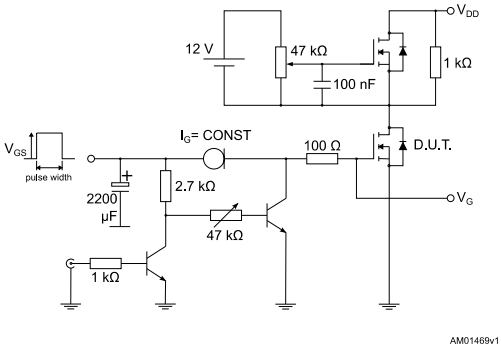


Figure 16: Test circuit for inductive load switching and diode recovery times

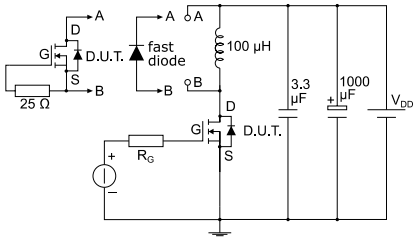


Figure 17: Unclamped inductive load test circuit

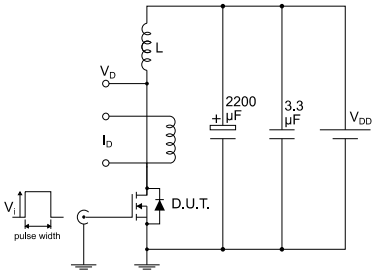


Figure 18: Unclamped inductive waveform

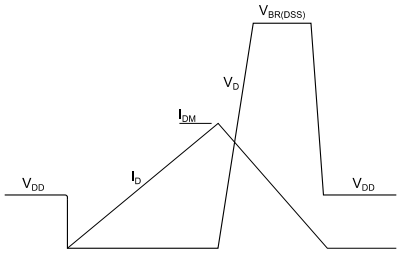
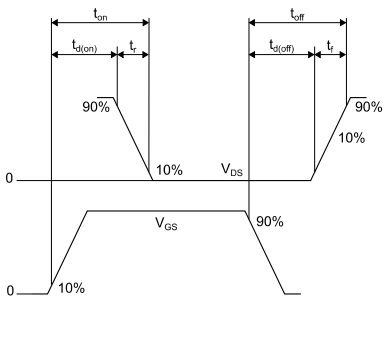


Figure 19: Switching time waveform



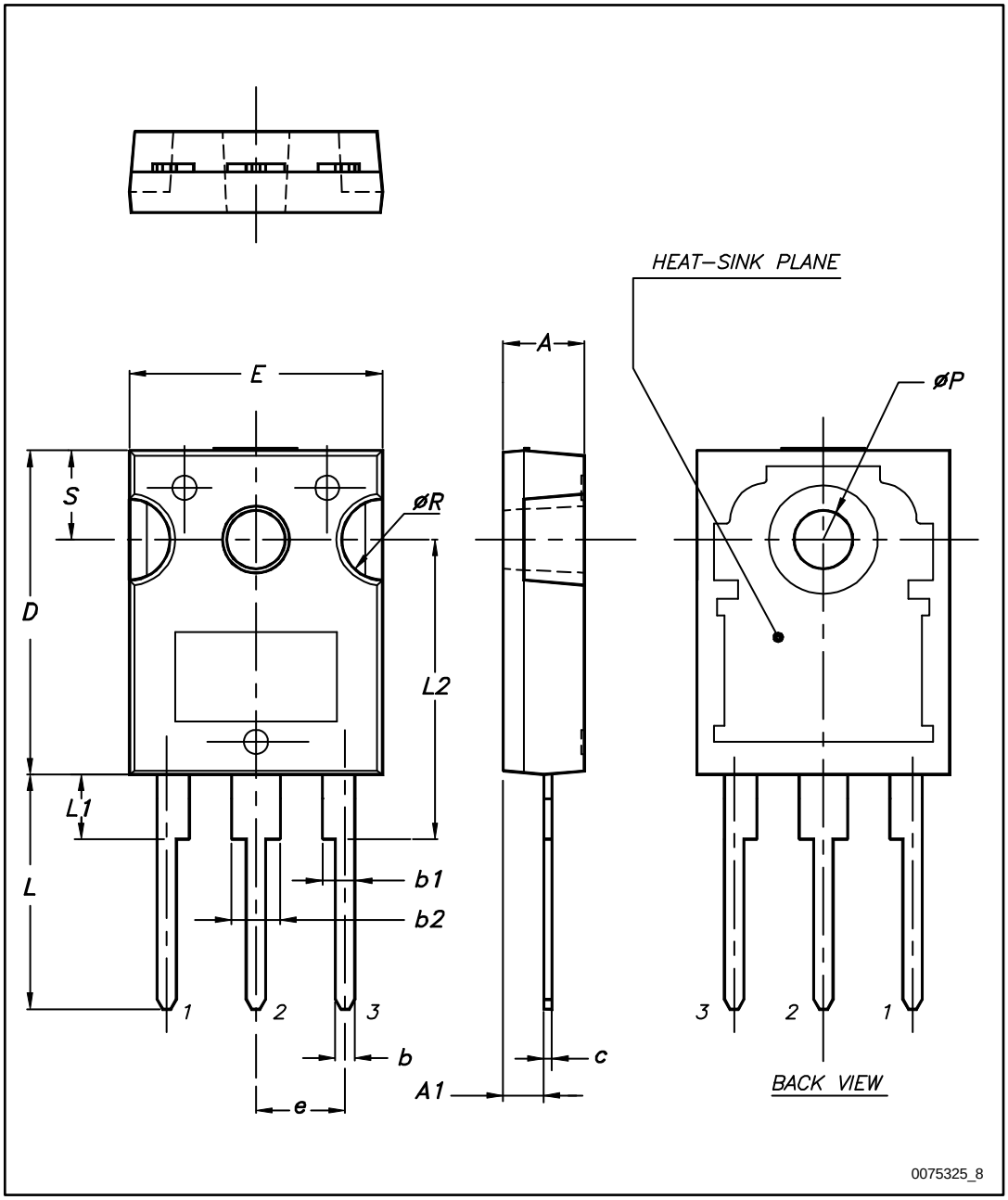
Downloaded from Arrow.com.

4 Package mechanical data

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 TO-247 package information

Figure 20: TO-247 package outline



Downloaded from Arrow.com.

Table 9: TO-247 package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.85		5.15
A1	2.20		2.60
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

Downloaded from Arrow.com.

5 Revision history

Table 10: Document revision history

Date	Revision	Changes
23-Oct-2007	1	First release.
27-May-2008	2	New value inserted in *Table 6: Dynamic*
15-Jul-2008	3	Document status promoted from preliminary data to datasheet.
24-Aug-2017	4	Updated *Section 2.1: "Electrical characteristics (curves)"* and *Section 4.1: "TO-247 package information"*.

Downloaded from Arrow.com.

IMPORTANT NOTICE – PLEASE 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. 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 acknowledgement.

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 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.

ST and the ST logo are trademarks of ST. 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.

© 2017 STMicroelectronics – All rights reserved

Downloaded from Arrow.com.