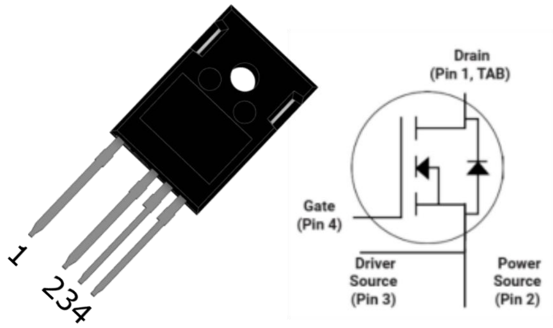
SG2M060075LJ-A

TriQSiC™ 750V Silicon Carbide Power MOSFET G2 （ N Channel Enhancement ）

Features

- High speed switching
- Very low switching losses
- Fully controllable dv/dt
- High blocking voltage with low on-resistance
- Fast intrinsic diode with low reverse recovery (Qrr)
- Temperature independent turn-off switching losses
- Halogen free, RoHS compliant



TO-247-4L

Benefits

- Cooling effort reduction
- Efficiency improvement
- Reduced cooling requirements
- Increased power density
- Increased system switching frequency

Applications

- On-board charger/PFC
- EV battery chargers
- Booster/DC-DC converter
- Switch mode power supplies

Table 1 Key performance and package parameters

Type	V_{DS}	I_{DS} (T_C = 25°C, $R_{th\ (j\text{-}c),max}$)	$R_{DS(on),\ typ}$ (V_{GS} = 18V, I_D = 14A, T_J = 25°C)	$T_{J,max}$	Marking	Package
SG2M060075LJ-A	750V	44A	60mΩ	175℃	SG2M060075LJ-A	TO-247-4L

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1、Maximum ratings

Table 2 Maximum rating (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{DS,max}$	Drain source voltage	750	V	V_{GS} = 0V, I_D = 100μA	
$V_{GS,max}$	Gate source voltage	-8 /+22	V	Absolute maximum values	Note1
$V_{GSpulse}$	Gate-source voltage,max. transient voltage	-10 /+25	V	t_p≤0.5μs, D<0.01	
V_{GSop}	Gate source voltage	-4 /+18	V	Recommended operational values	
I_D	Continuous drain current	44	A	V_{GS} = 18V, T_C = 25˚C	Fig.19
		31		V_{GS} = 18V, T_C = 100˚C	
I_D(pulse)	Pulsed drain current	112	A	Pulse width t_P =100µs limited by $T_{J,max}$	Fig.22
P_D	Power dissipation	171	W	T_C = 25˚C,T_J = 175˚C	Fig.20
T_J ,T_{stg}	Operating Junction and storage temperature	-55 to +175	˚C		
T_L	Soldering temperature	260	˚C	1.6mm (0.063”) from case for 10s	
T_M	Mounting torque	1 8.8	Nm lbf-in	M3 or 6-32 screw	

Note 1：when using MOSFET Body Diode $V_{GS,max}$ = -4 / +22V

2、Thermal characteristics

Table 3 Thermal characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$R_{th(j-c)}$	Thermal resistance from junction to case	-	0.7	0.88	°C/W	-	Fig.21

3、Electrical characteristics

3.1 Static characteristics

Table 4 Static characteristics (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-source breakdown voltage	750	-	-	V	V_{GS} = 0V, I_D = 100μA	
$V_{GS(th)}$	Gate threshold voltage	2.3	3.0	3.8	V	V_{DS} = V_{GS}, I_D = 4.5mA	Fig.11
		-	2.4	-	V	V_{DS} = V_{GS}, I_D = 4.5mA T_J = 175°C	
I_{DSS}	Zero gate voltage drain current	-	1	10	μA	V_{DS} = 750V, V_{GS} = 0V	
I_{GSS}	Gate source leakage current	-	-	100	nA	V_{GS} = 18V, V_{DS} = 0V	
$R_{DS(on)}$	Current drain-source on-state resistance	-	71	98	mΩ	V_{GS} = 15V, I_D = 14A	Fig.4,5, 6
		-	94	-		V_{GS} = 15V, I_D = 14A, T_J = 175°C	
		-	60	78		V_{GS} = 18V, I_D = 14A	
		-	89	-		V_{GS} = 18V, I_D = 14A, T_J = 175°C	
g_{fs}	Transconductance	-	10	-	S	V_{DS} = 20V, I_D = 14A	Fig.7
		-	9	-		V_{DS} = 20V, I_D = 14A, T_J = 175°C	
$R_{g,int}$	Intenal gate resistance	-	4.5	-	Ω	V_{AC} = 25mV, f = 1MHz, open drain	

3.2 Dynamic characteristics

Table 5 Dynamic characteristics (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
C_{iss}	Input capacitance	-	879	-	pF	V_{DS} = 500V, V_{GS} = 0V T_J = 25°C, V_{AC} = 25mV f = 100kHz	Fig.17, 18
C_{oss}	Output capacitance	-	90	-			
C_{rss}	Reverse capacitance	-	5.5	-			
E_{oss}	Coss stored energy	-	13	-	μJ		Fig.16

Q_{gs}	Gate source charge	-	8.5	-	nC	V_{DS} = 500V, V_{GS} = -4/+18V I_D = 14A	Fig.12
Q_{gd}	Gate drain charge	-	8	-			
Q_g	Gate charge	-	24	-			

3.3 Switching characteristics

Table 6 Dynamic characteristics(Tc = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
E_{on}	Turn on switching energy	-	59	-	μJ	V_{DS} = 500V, V_{GS} = -4/+18V I_D = 14A, Rg = 2.5Ω L = 120μH	Fig.26
E_{off}	Turn off switching energy	-	20	-			
$t_{d(on)}$	Turn on delay time	-	9.6	-	ns		Fig.27
t_r	Rise time	-	9.4	-			
$t_{d(off)}$	Turn off delay time	-	17.2	-			
t_f	Fall time	-	9.7	-			

Table 7 Body diode characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode forward voltage	-	3.7	-	V	V_{GS} = -4V, I_{SD} = 7A	Fig.8,9,10
		-	3.2	-	V	V_{GS} = -4V, I_{SD} = 7A T_J = 175°C	
I_S	Continuous diode forward current	-	37	-	A	V_{GS} = -4V, Tc = 25°C	Note2
t_{rr}	Reverse recovery time	-	19	-	ns	V_R = 500V, V_{GS} = -4V I_{SD} = 14A di/dt = 2644A/μs T_J = 175°C	
Q_{rr}	Reverse recovery charge	-	178	-	nC		
I_{rrm}	Peak reverse recovery current	-	17	-	A		

Note 2: When using SiC Body Diode the maximum recommended V_{GS} = -4 V

4、Electrical characteristic diagrams

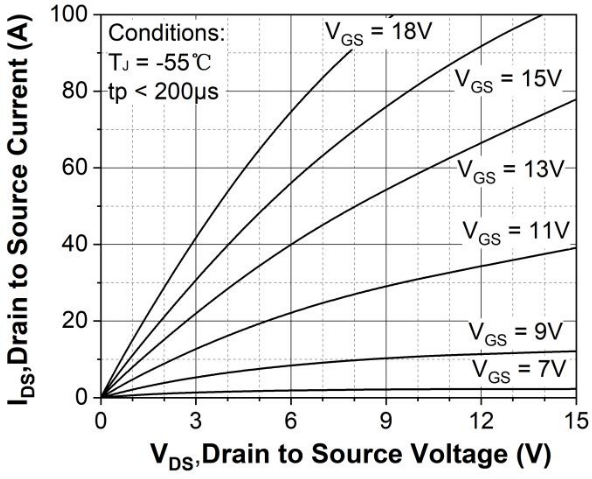


Figure 1. Output characteristics T_J = -55 ºC

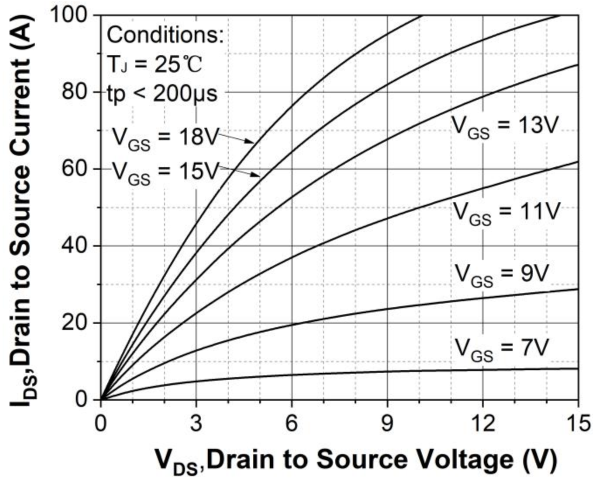


Figure 2. Output characteristics T_J = 25 ºC

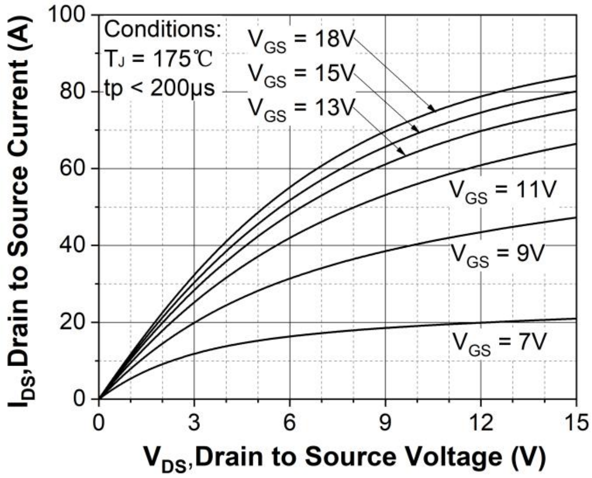


Figure 3. Output characteristics T_J = 175 ºC

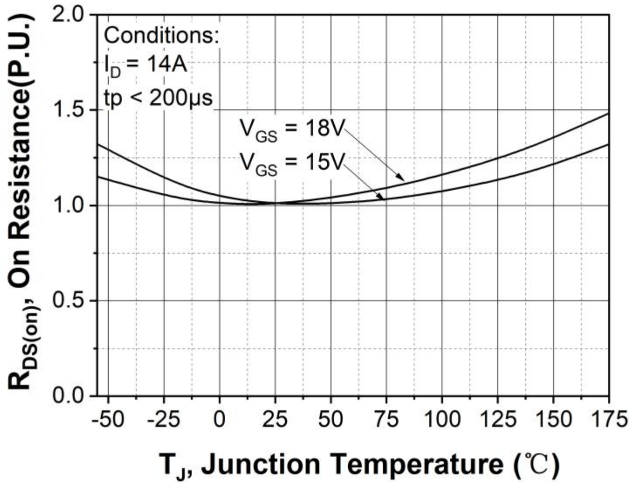


Figure 4. Normalized on-resistance vs. temperature

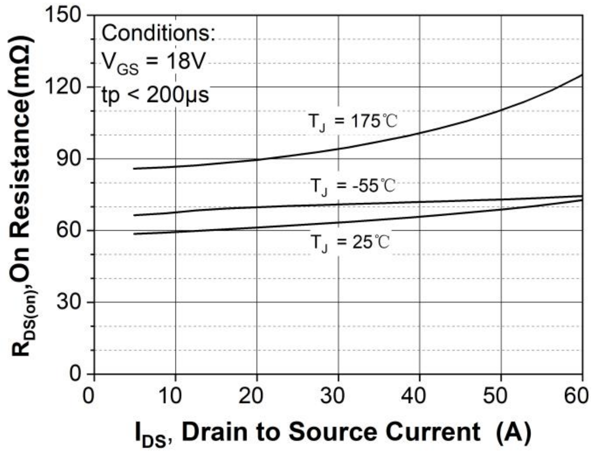


Figure 5. On-resistance vs. drain current for various temperatures

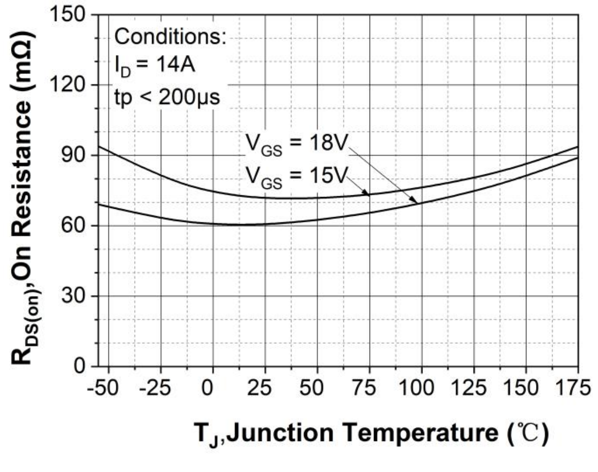


Figure 6. On-resistance vs. temperature for various gate voltages

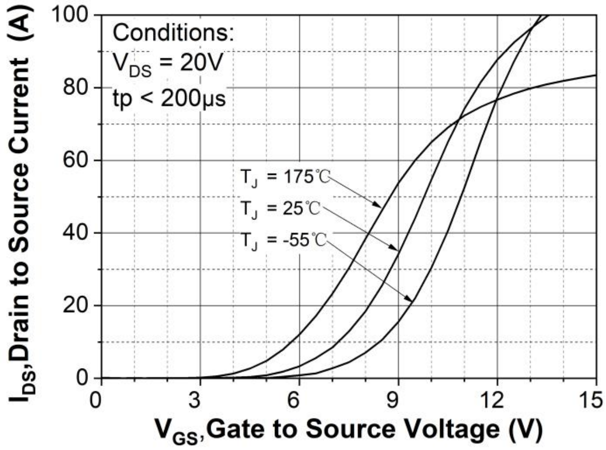


Figure 7. Transfer characteristic for various junction temperatures

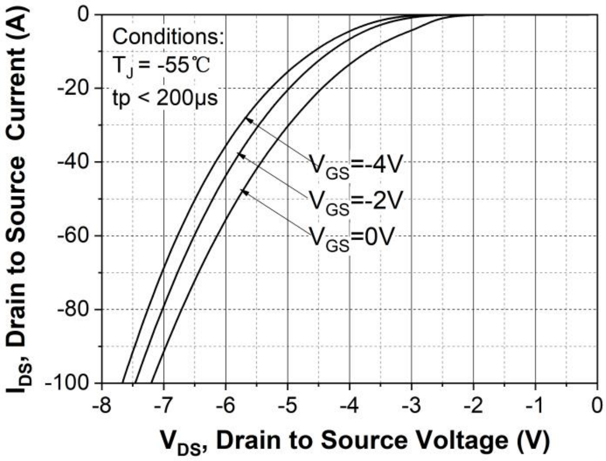


Figure 8. Body diode characteristic at T_J = -55 ºC

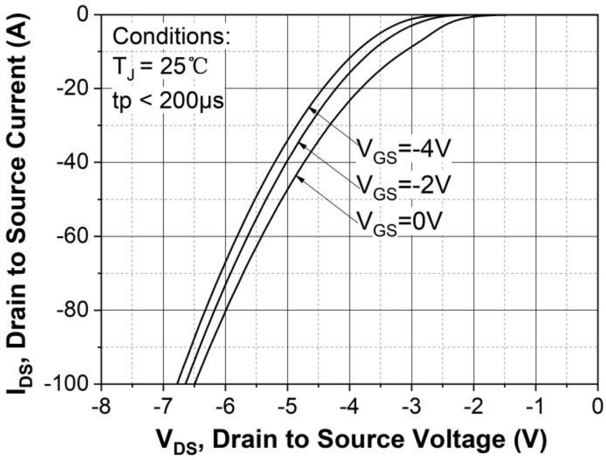


Figure 9. Body diode characteristic at T_J = 25 ºC

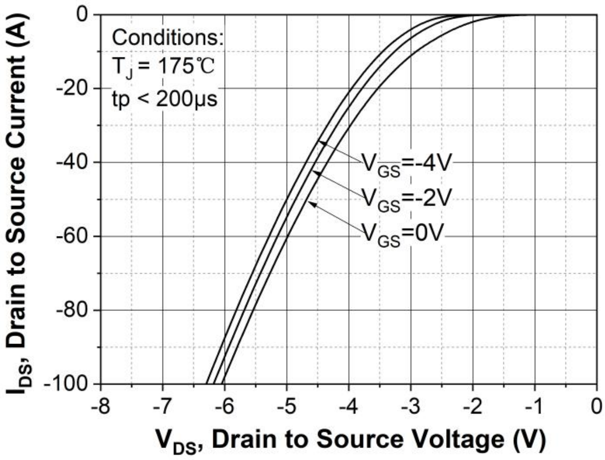


Figure 10. Body diode characteristic at T_J = 175ºC

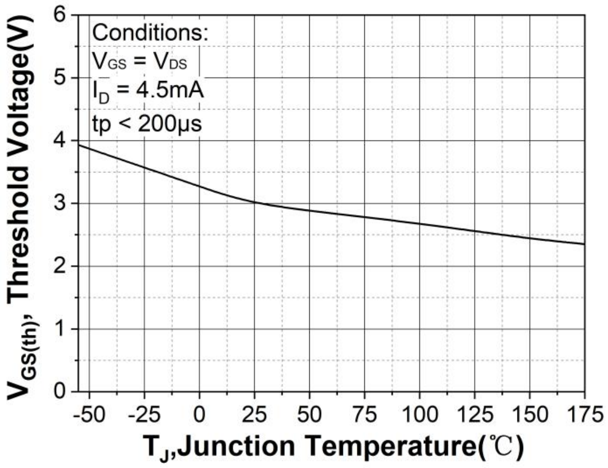


Figure 11. Threshold voltage vs. temperature

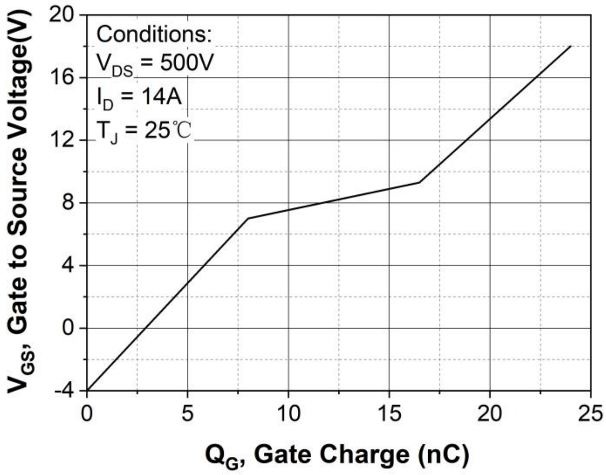


Figure 12. Gate charge characteristic

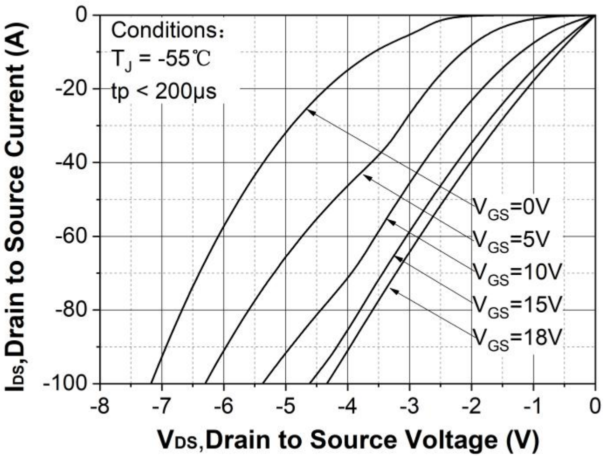


Figure 13. 3rd quadrant characteristic at T_J = -55 ºC

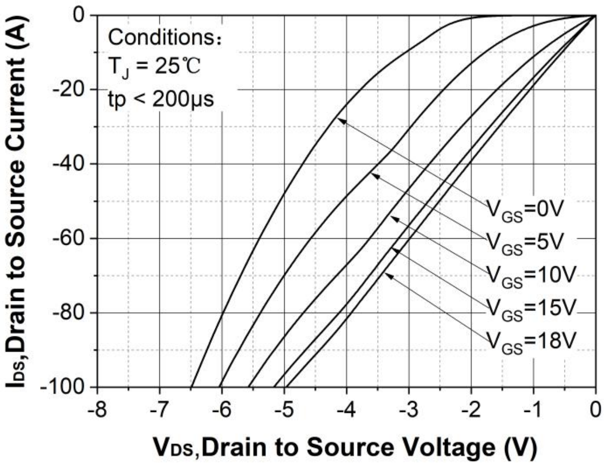


Figure 14. 3rd quadrant characteristic at T_J = 25 ºC

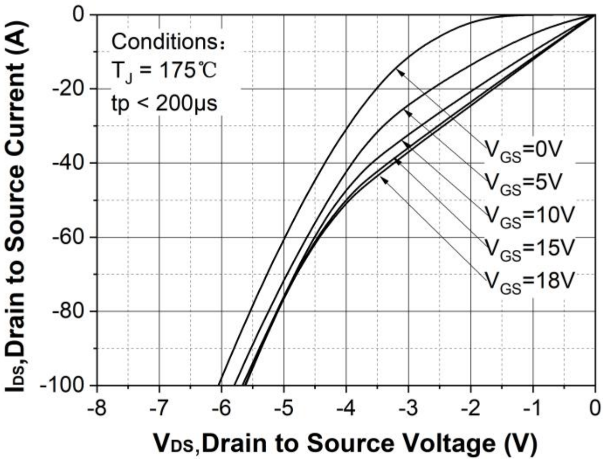


Figure 15. 3rd quadrant characteristic at T_J = 175 ºC

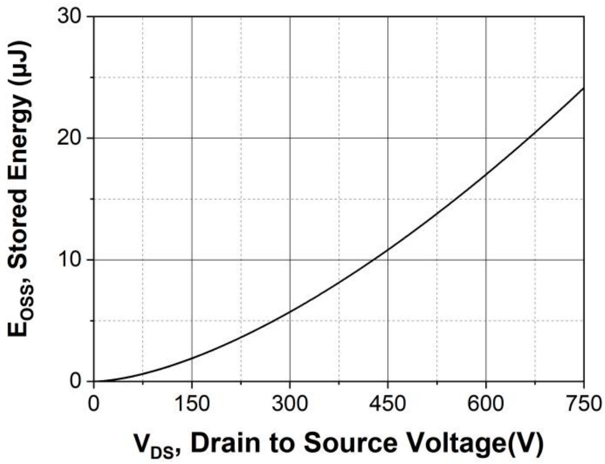


Figure 16. Output capacitor stored energy

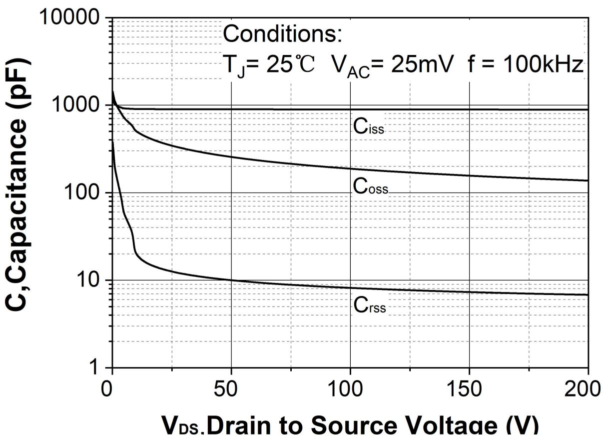


Figure 17. Capacitances vs. drain-source voltage (0 - 200V)

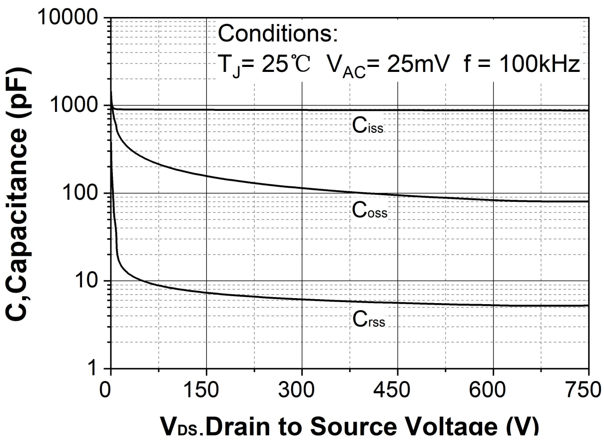


Figure 18. Capacitances vs. drain-source voltage (0 - 750V)

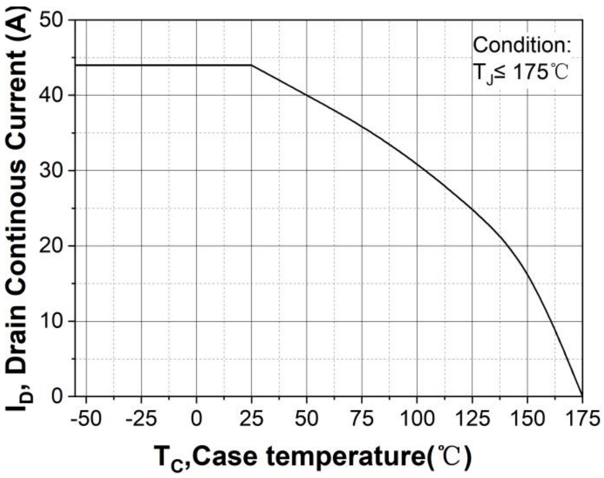


Figure 19. Continuous drain current derating vs. case temperature

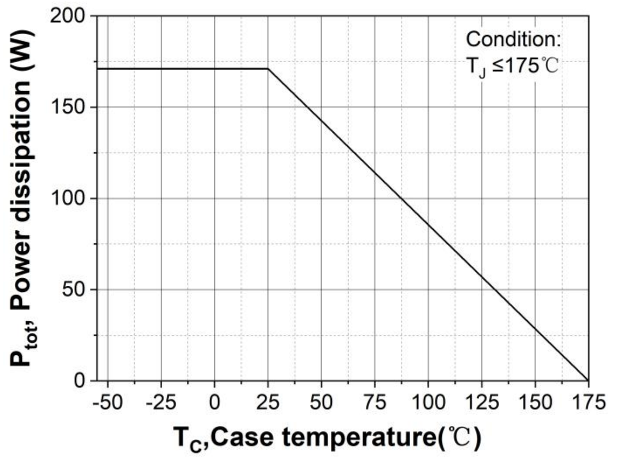


Figure 20. Maximum power dissipation derating vs. case temperature

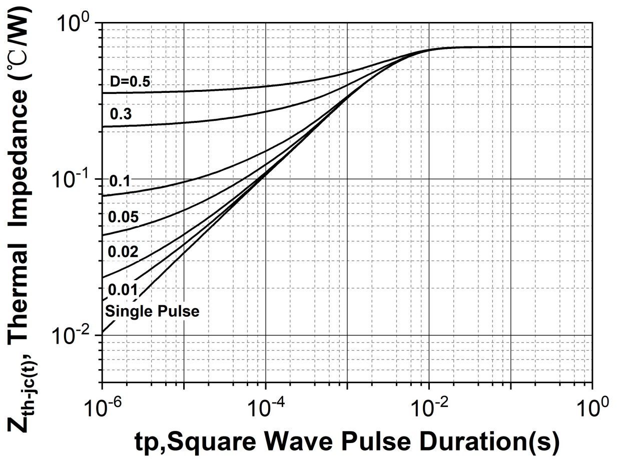


Figure 21. Transient thermal impedance (junction - case)

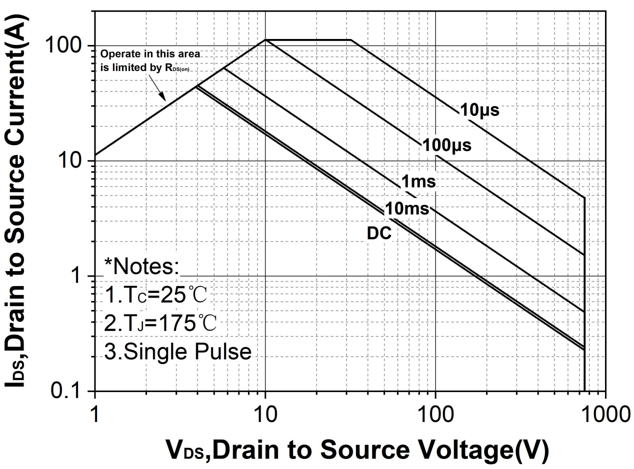


Figure 22. Safe operating area

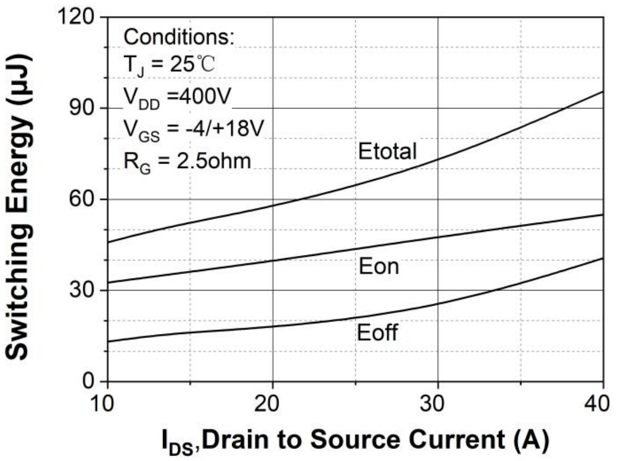


Figure 23. Clamped Inductive switching energy vs. drain current (V_{DD} = 400V)

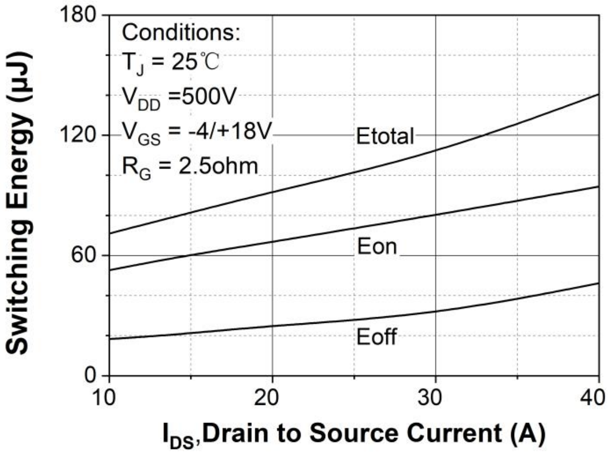


Figure 24. Clamped inductive switching energy vs. drain current (V_{DD} = 500V)

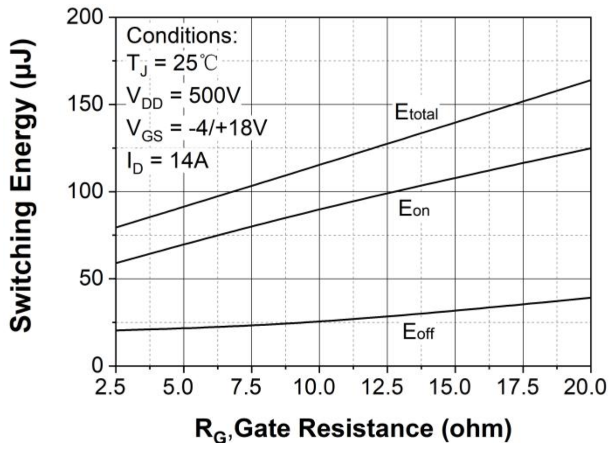


Figure 25. Clamped inductive switching energy vs. R_G (ext)

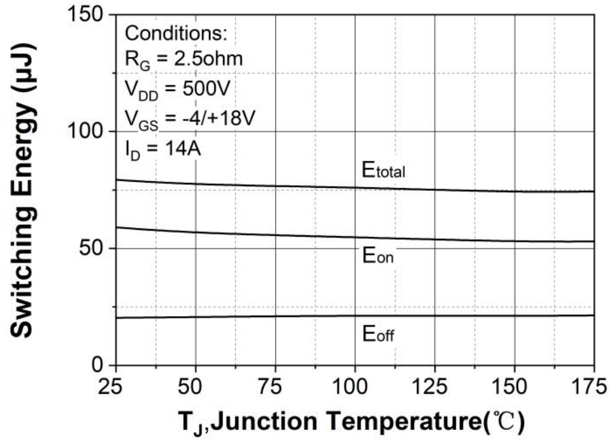


Figure 26. Clamped inductive switching energy vs. temperature

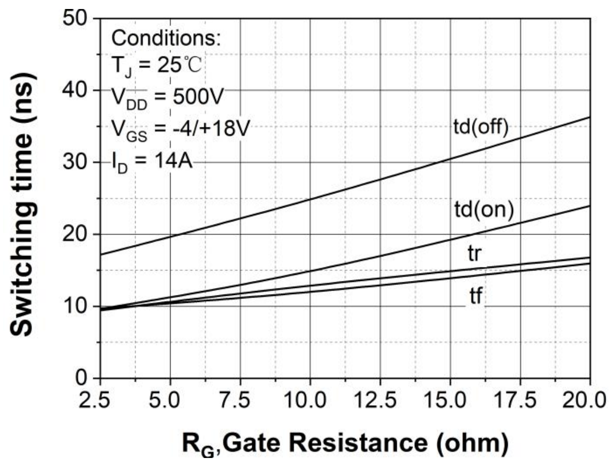
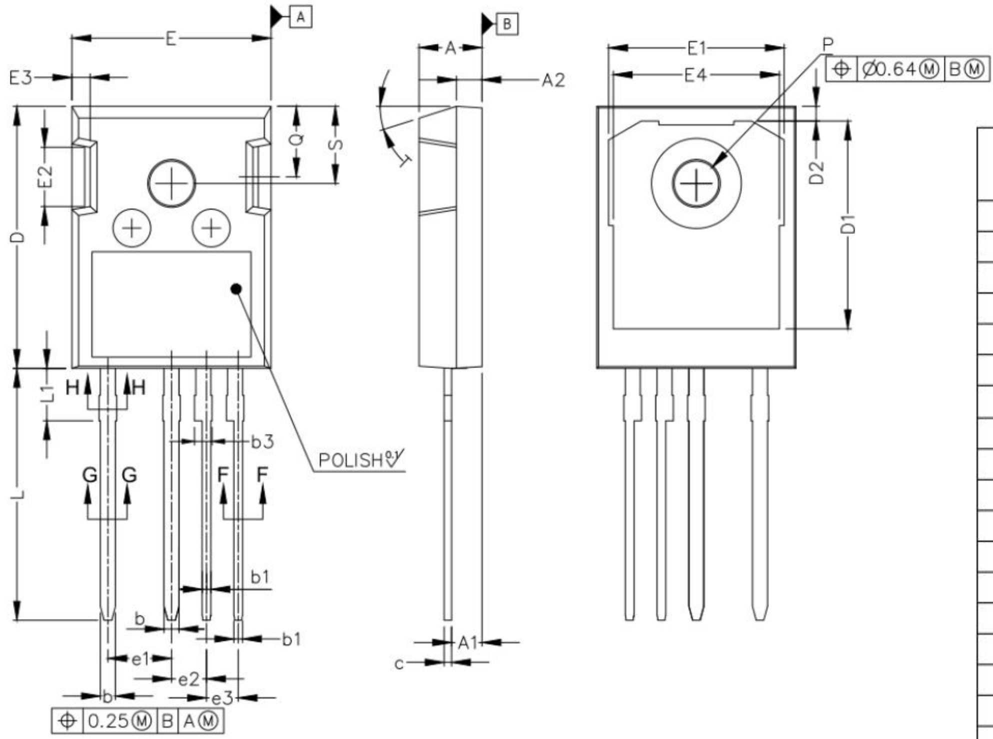
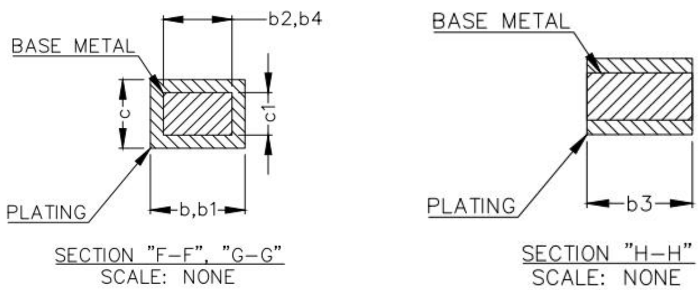


Figure 27. Switching times vs. R_G (ext)

5、Package drawing (TO-247-4L-C)





SYM	MILLIMETERS	
	MIN	MAX
A	4.83	5.21
A1	2.29	2.54
A2	1.90	2.16
b	1.10	1.30
b1	0.65	0.80
b2	1.10	1.25
b3	1.34	1.44
b4	0.65	0.80
c	0.55	0.68
c1	0.55	0.65
D	20.80	21.10
D1	16.15	17.65
D2	0.95	1.35
E	15.70	16.13
E1	13.10	14.15
E2	4.32	5.10
E3	1.00	2.60
E4	12.38	13.50
e1	5.08 BSC	
e2	2.79 BSC	
e3	2.54 BSC	
L	19.72	20.32
L1	3.97	4.37
ø P	3.51	3.70
Q	5.49	6.00
S	6.04	6.30

6、Test conditions

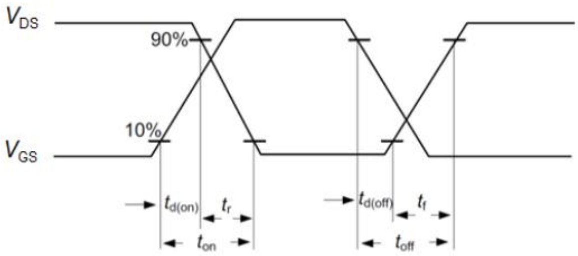


Figure A. Definition of switching times

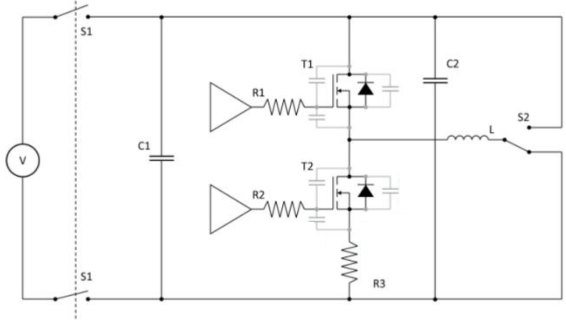


Figure B. Dynamic test circuit

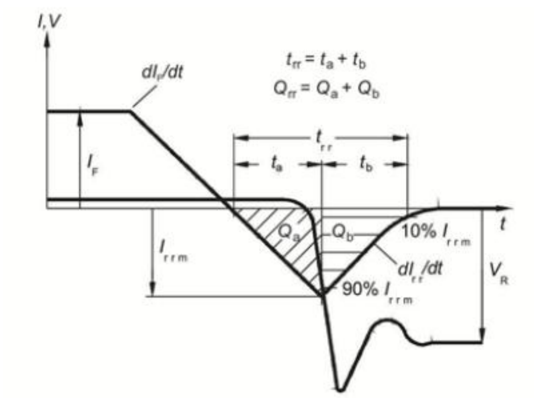


Figure C. Definition of body diode switching characteristics

Revision history

Document version	Date of release	Document stage	Description of changes
V01_00	2025-08-20	——	——
V01_01	2025-09-05	——	——
V01_02	2025-11-12	——	——
V01_03	2025-11-08	——	——
V02_00	2025-12-11	——	——
V02_01	2025-12-17	——	——
V02_02	2026-02-24	Final	——

Attention

1. **RoHS compliance**

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/ EC (RoHS2), as implemented January 2, 2013.

2. **REACH compliance**

REACh substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact a Sichain representative to insure you get the most up-to-date REACh SVHC Declaration. REACh banned substance information (REACh Article 67) is also available upon request.

3. With respect to information regarding the application of the product, Sichain hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

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5. Specifications of any and all products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance,characteristics,and functions of the described products as mounted in the customer's products or equipment.

6. Due to technical requirements products may contain dangerous substances. For information on the types in question please contact Sichain office.

7. Except as otherwise explicitly approved by Sichain in a written document signed by authorized representatives of Sichain, Sichain' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.

8. For use of our products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a Sichain representatives, for example but not limited to: transportation equipment,primary communication equipment,traffic lights,fire/crime prevention, safety equipment, medical systems, and power transmission systems.