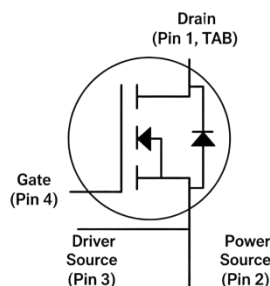


Silicon Carbide Power MOSFET

Parameter	Value	Unit
V_{DS}	3300	V
I_D	45	A
$R_{DS(ON)}$	70	m Ω
Q_G	290	nC



TO-247-4L

Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggedness
- Easy to Parallel and Simple to Drive

Applications

- Motor Drive
- Solar Inverters
- Battery Chargers
- High Voltage DC/DC Converters
- Switched-Mode Power Supply(SMPS)

Absolute Maximum Ratings (at $T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-source Voltage	V_{DS}	3300	V
Gate-source Voltage (Absolute maximum values)	V_{GS}	-10/+25	V
Gate-source Voltage (Recommended operational values)		-5/+20	
Drain Current (continuous; $T_C=25^\circ\text{C}$) $V_{GS}=20\text{V}$	I_D	45	A
Drain Current (continuous; $T_C=100^\circ\text{C}$) $V_{GS}=20\text{V}$		29	
Drain Current (pulsed)	I_{DM}	90	A
Power Dissipation ($T_C=25^\circ\text{C}$, $T_J=175^\circ\text{C}$)	P_D	600	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175	$^\circ\text{C}$
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.25	$^\circ\text{C/W}$
Thermal Resistance From Junction to Ambient	$R_{\theta JA}$	28	

Electrical Characteristics (at $T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Static characteristics						
Drain-Source Breakdown Voltage	B _{VDS}	V _{GS} =0V; I _D =1mA	3300	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =3300V; V _{GS} =0V	-	-	200	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =20V; V _{DS} =0V	-	-	250	nA
Gate Threshold Voltage	V _{GS(th)}	V _{GS} =V _{DS} ; I _D =10mA; T _J =25°C	2.0	3.4	4.5	V
Static Drain-Source on Resistance	R _{DS(on)}	V _{GS} =20V; I _D =20A; T _J =25°C	-	70	-	mΩ
		V _{GS} =20V; I _D =20A; T _J =175°C	-	189	-	
Transconductance	G _{fs}	V _{GS} =10V; I _D =20A; T _J =25°C	-	7.1	-	S
		V _{GS} =10V; I _D =20A; T _J =175°C	-	08	-	
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} =1000V; f=1MHz; V _{GS} =0V T _J =25°C	-	5199	-	pF
Output Capacitance	C _{oss}		-	100	-	
Reverse Transfer Capacitance	C _{rss}		-	16	-	
Coss Stored Energy	E _{oss}		-	66	-	uJ
Turn on Switching Energy	E _{on}	V _{DD} =1200V; V _{GS} =-5/20V; I _D =20A; R _{g(ext)} =3Ω	-	826	-	uJ
Turn off Switching Energy	E _{off}		-	209	-	
Total Gate Charge	Q _G	V _{DD} =1000V; V _{GS} =-5/20V; I _D =20A; T _J =25°C	-	290	-	nC
Gate-Source Charge	Q _{GS}		-	56	-	
Gate-Drain Charge	Q _{GD}		-	57	-	
Internal Gate Resistor	R _{Gint}	f=1MHz; V _{AC} =25mV	-	0.85	-	Ω
Turn-on Delay Time	t _{d(on)}	V _{DD} =1200V; V _{GS} =-5/20V; I _D =20A; R _{g(ext)} =3Ω	-	39	-	ns
Rise Time	t _r		-	26	-	
Turn-off Delay Time	t _{d(off)}		-	55	-	
Fall Time	t _f		-	22	-	

Reverse SiC Diode Characteristics(at $T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Values			Units
			Min.	Typ.	Max.	
Diode Forward Voltage	V_{FSD}	$V_{GS}=-5V; I_F=20A; T_J=25^\circ C$	-	6.5	-	V
Continuous Diode Forward Current	I_S	$T_C=25^\circ C$	-	45	-	A
Reverse Recovery Time	t_{RR}	$V_R=1200V; V_{GS}=-5V; I_F=20A;$ $di/dt=500A/\mu s; T_J=25^\circ C$	-	30	-	ns
Reverse Recovery Charge	Q_{RR}		-	150	-	nC
Peak Reverse Recovery Current	I_{RRM}		-	8.9	-	A

Typical Characteristics

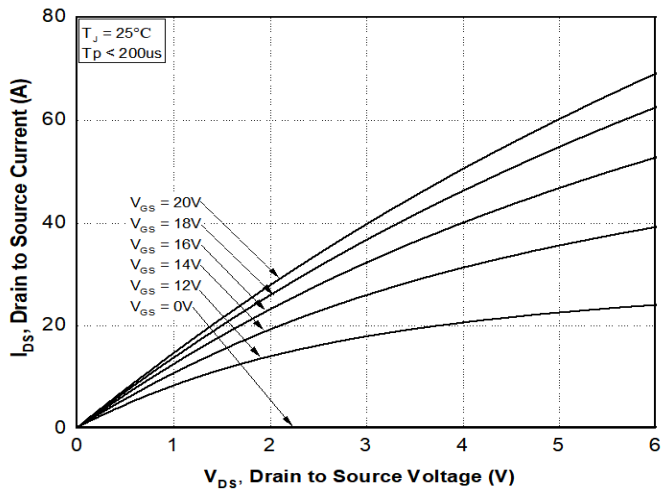


Figure 1. Output Characteristics $T_J = 25^\circ\text{C}$

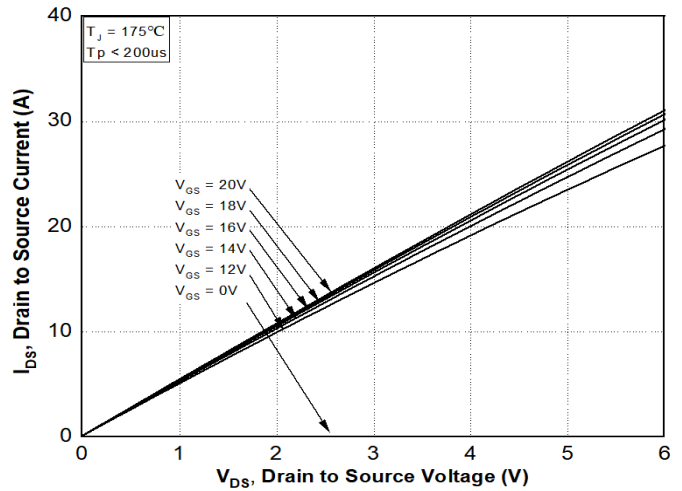


Figure 2. Output Characteristics $T_J = 175^\circ\text{C}$

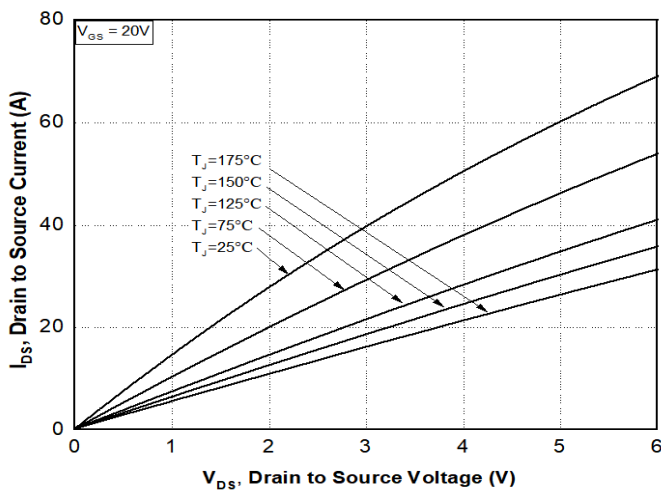


Figure 3. Output Characteristics ($V_{GS} = 20\text{V}$)

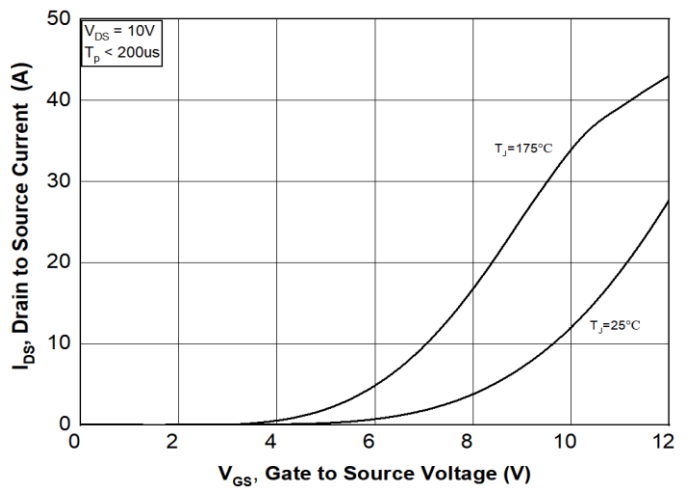


Figure 4. Transfer Characteristics

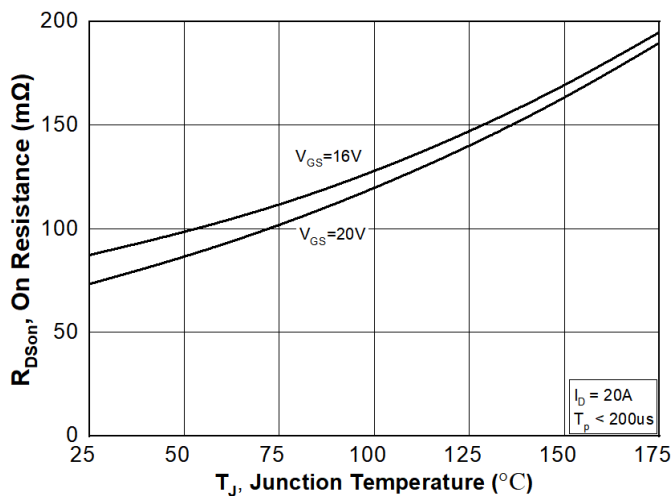


Figure 5. On-Resistance vs. Temperature

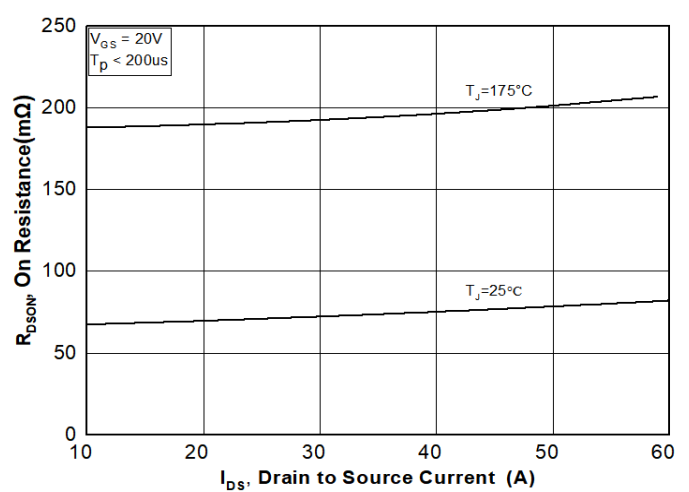


Figure 6. On-State Resistance vs. Drain Current

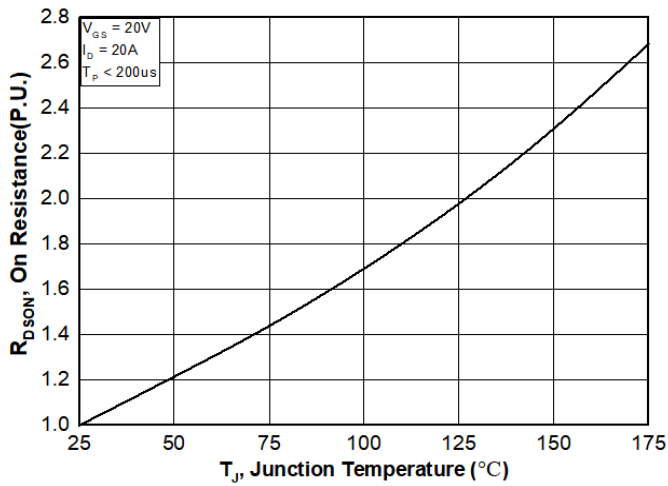


Figure 7. Normalized On-State Resistance vs. Temperature

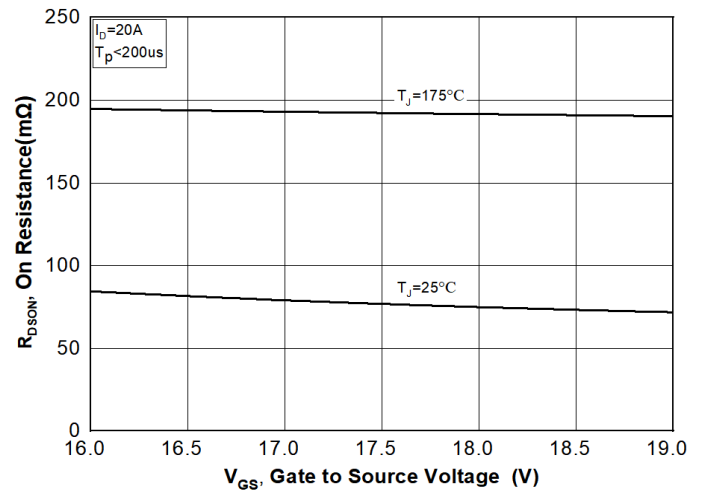


Figure 8. On-State Resistance vs. Gate Voltage

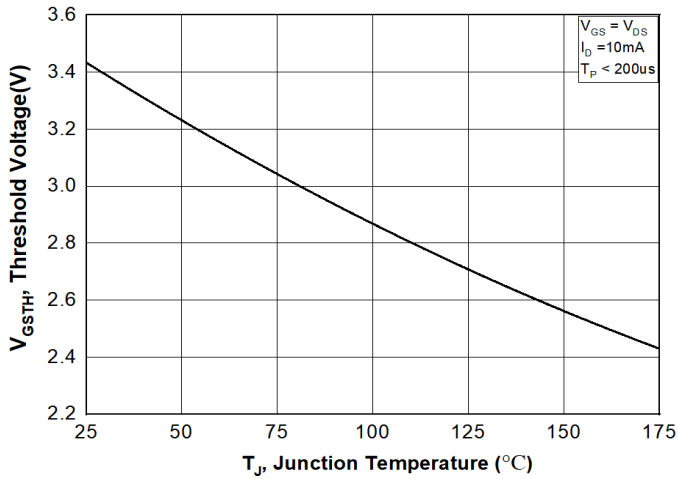


Figure 9. Threshold Voltage Characteristics

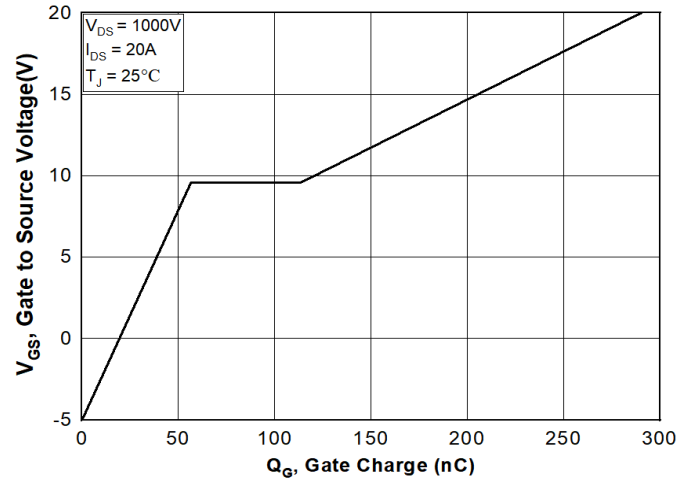


Figure 10. Gate Charge Characteristics

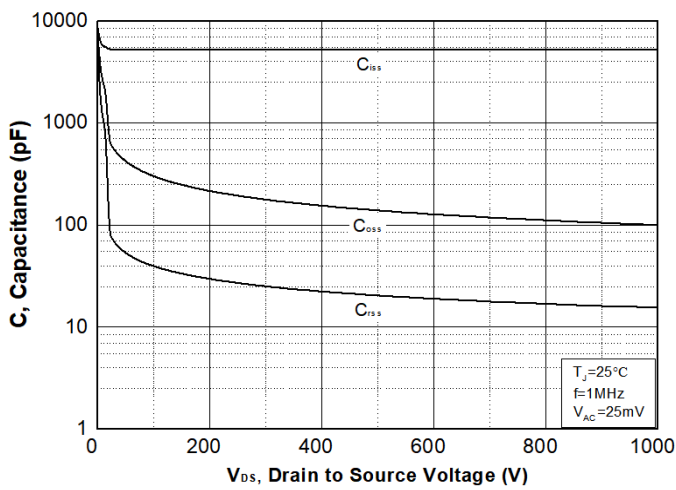


Figure 11. Capacitance vs. Drain-Source Voltage

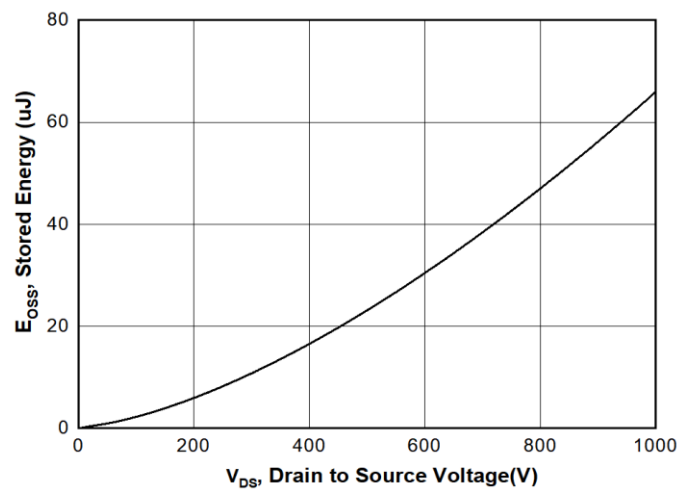


Figure 12. Output Capacitor Stored Energy

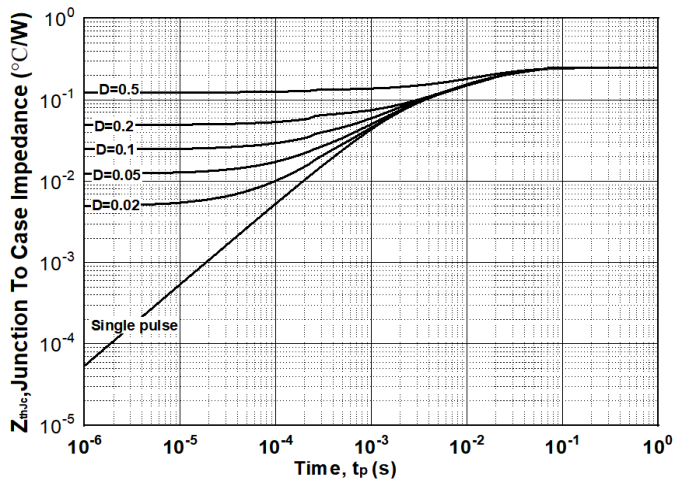


Figure 13. Transient Thermal Impedance (Junction - Case)

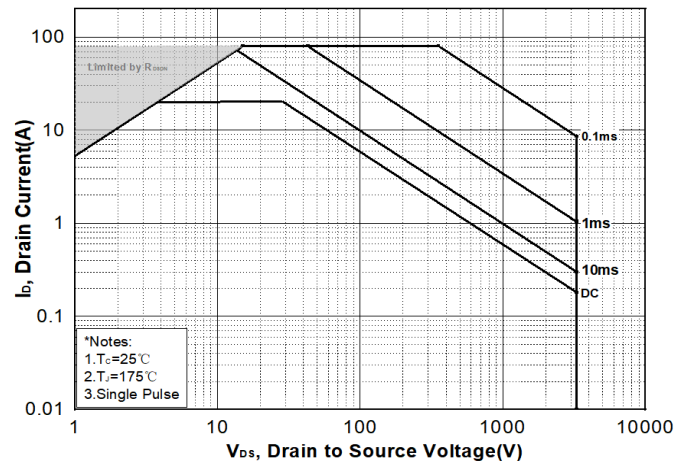


Figure 14. Safe Operating Area ($T_c = 25^\circ\text{C}$)

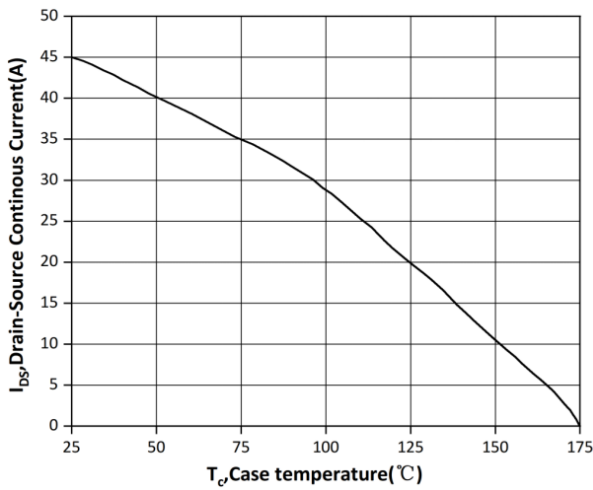


Figure 15. Current De-rating Curve

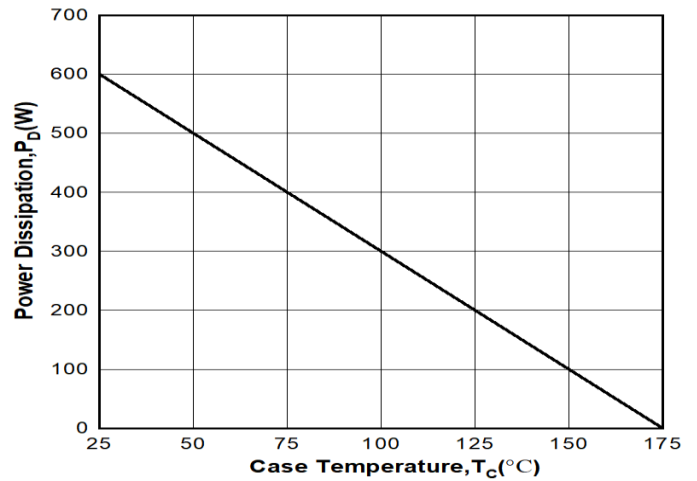


Figure 16. Power De-rating Curve

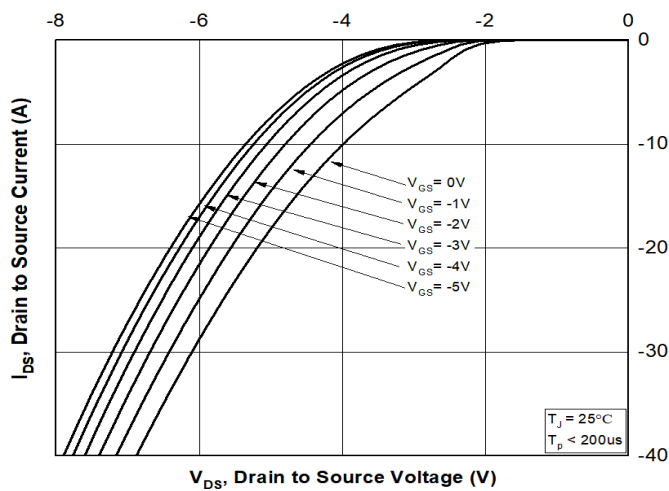


Figure 17. Body Diode Characteristics at $T_J = 25^\circ\text{C}$

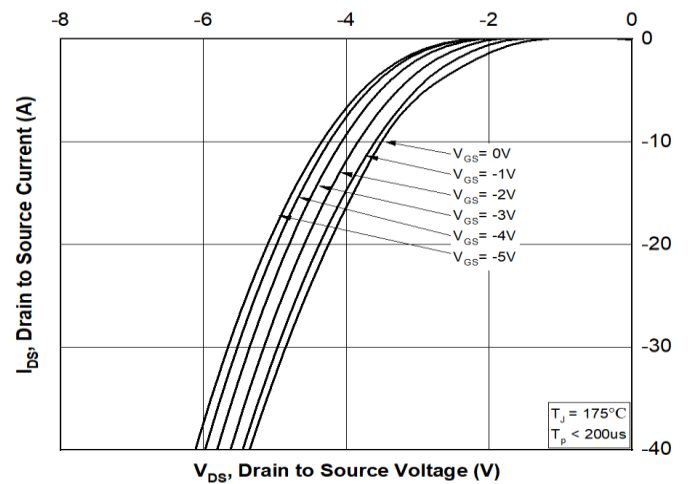


Figure 18. Body Diode Characteristics at $T_J = 175^\circ\text{C}$

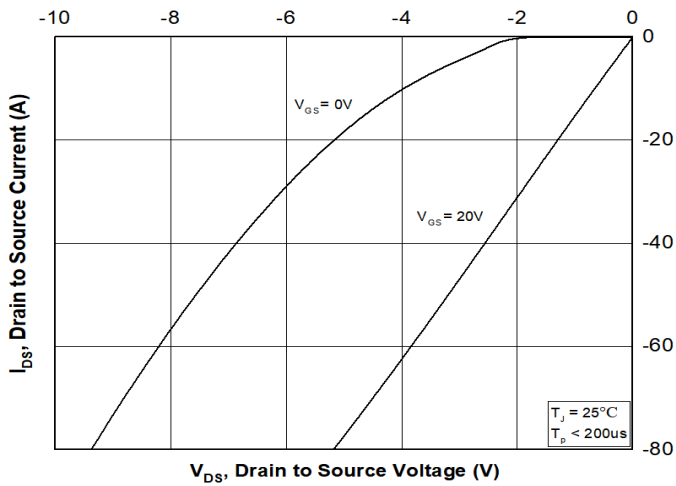


Figure 19. 3rd Quadrant Characteristics at $T_J = 25\text{ }^{\circ}\text{C}$

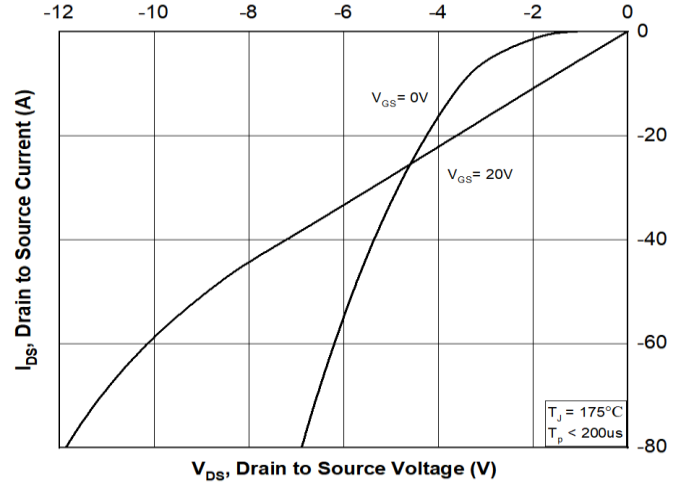


Figure 20. 3rd Quadrant Characteristics at $T_J = 175\text{ }^{\circ}\text{C}$

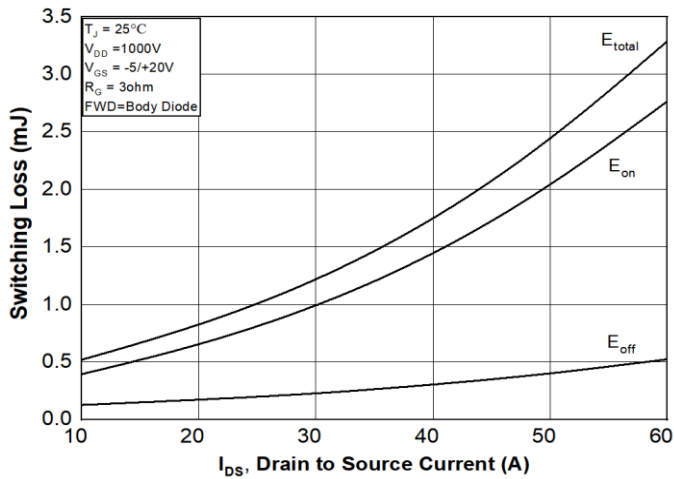


Figure 21. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 1000\text{V}$)

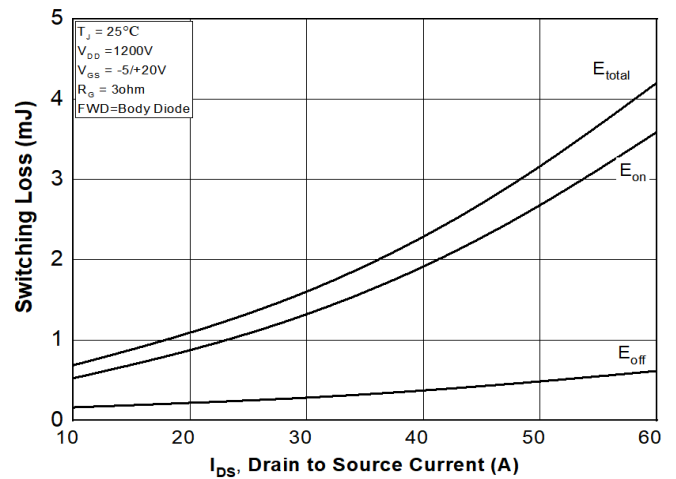


Figure 22. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 1200\text{V}$)

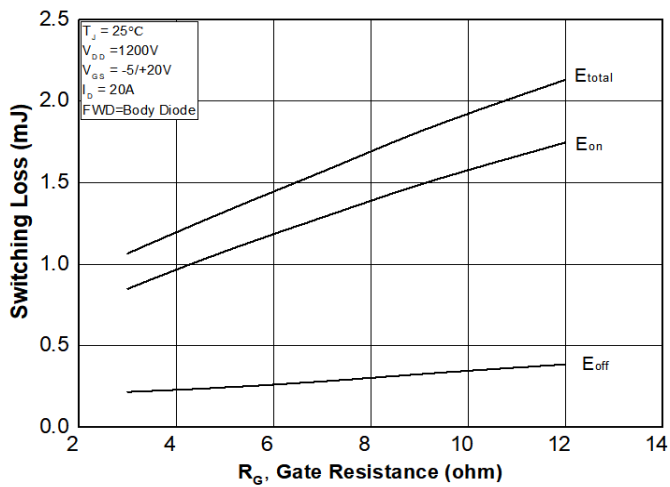


Figure 23. Clamped Inductive Switching Energy vs. $R_{G(\text{ext})}$

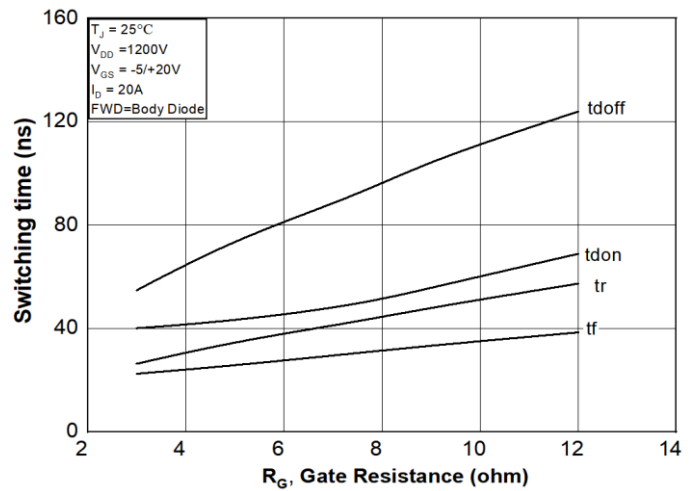


Figure 24. Switching Times vs. $R_{G(\text{ext})}$

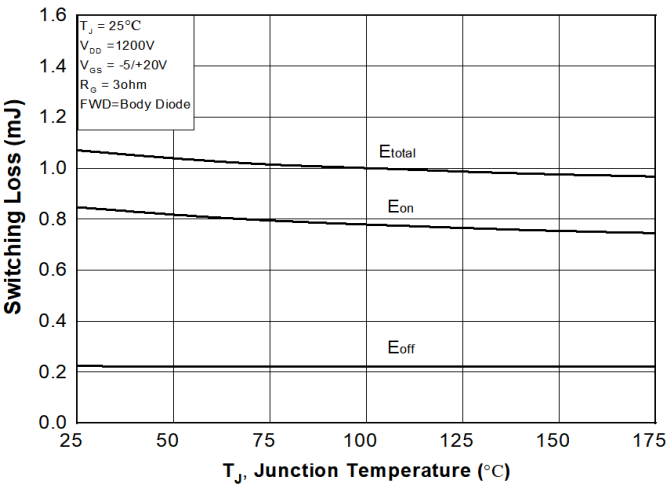


Figure 25. Clamped Inductive Switching Energy vs. Temperature

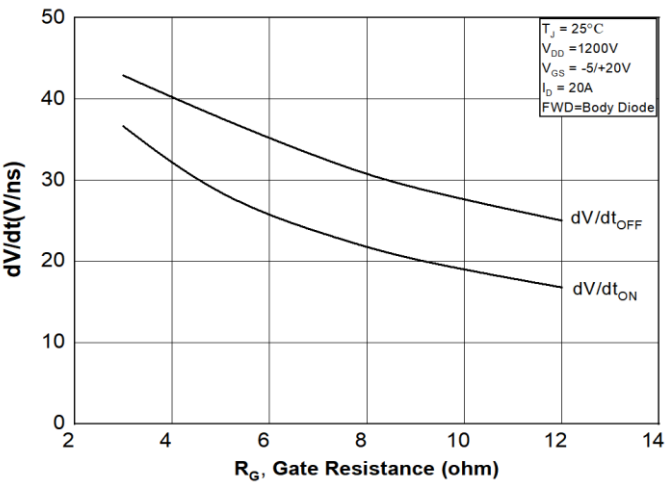


Figure 26. dv/dt v/s R_{G(ext)}

TO-247-4L



SYM	MILLIMETERS	
	MIN	MAX
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b'	1.07	1.28
b	1.07	1.33
b1	2.39	2.94
b2	2.39	2.84
b3	1.07	1.60
b4	1.07	1.50
b5	2.39	2.69
b6	2.39	2.64
b7	1.30	1.70
b8	1.80	2.20

c'	0.55	0.65
c	0.55	0.68
D	23.30	23.60
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
e	2.54 BSC	
e1	5.08 BSC	
N*	4	
L	17.31	17.82
L1	3.97	4.37
L2	2.35	2.65
øP	3.51	3.65
Q	5.49	6.00
S	6.04	6.30
T	17.5° REF.	
W	3.5 ° REF.	
X	4° REF.	

*Important Usage Information and Disclaimer

The specifications of Zhuhai Hypersemi Co., Ltd. products are not guarantees of product characteristics. They reflect typical performance expected in standard applications, which may vary with specific uses. Users must conduct prior testing for their applications and make necessary adjustments.

Users are responsible for the safety of applications utilizing our products and must implement adequate safety measures to prevent physical injury, fire, or other risks in case of product failure. It is the user's duty to ensure that application designs comply with all applicable laws and standards. Our products must not be used in any applications where a product failure could reasonably result in personal injury, unless specifically authorized in a signed document by Zhuhai Hypersemi Co., Ltd.

No representations or warranties are made regarding the accuracy or completeness of this information, including any claims of non-infringement of third-party intellectual property rights. Zhuhai Hypersemi Co., Ltd. assumes no liability for any applications or uses of its products and does not grant any licenses to its intellectual property rights or those of others. We also make no claims regarding non-infringement of third-party intellectual property rights that may arise from applications.

Due to technical requirements, our products may contain hazardous substances. For details, please contact your nearest sales office. This document replaces all previous information and may be updated. We reserve the right to make changes.