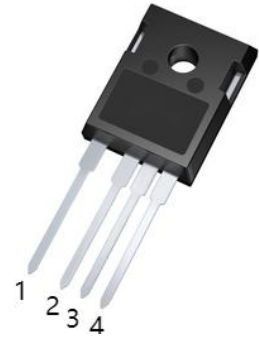
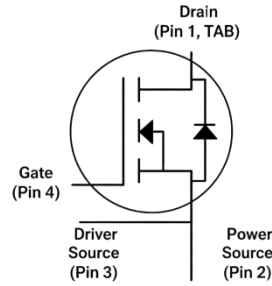


Silicon Carbide Power MOSFET

Parameter	Value	Unit
V_{DS}	3300	V
I_D	3.8	A
$R_{DS(ON)}$	1.0	Ω
Q_G	33	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 $T_J=25^\circ\text{C}$ 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	3.8	A
Drain Current (continuous; $T_c=100^\circ\text{C}$) $V_{GS}=20\text{V}$		2.3	
Drain Current (pulsed)	I_{DM}	16	A
Power Dissipation ($T_c=25^\circ\text{C}$, $T_J=175^\circ\text{C}$)	P_D	100	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175	$^\circ\text{C}$
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.5	$^\circ\text{C/W}$
Thermal Resistance From Junction to Ambient	$R_{\theta JA}$	52	

Electrical Characteristics

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Static characteristics (at $T_C=25^\circ\text{C}$ unless otherwise specified)						
Drain-Source Breakdown Voltage	$B_{V_{DS}}$	$V_{GS}=0V; I_D=100\mu\text{A}$	3300	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=3300V; V_{GS}=0V$	-	2	100	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=20V; V_{DS}=0V$	-	-	100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}; I_D=0.5\text{mA}; T_J=25^\circ\text{C}$	2.0	2.7	4.0	V
Static Drain-Source on Resistance	$R_{DS(on)}$	$V_{GS}=20V; I_D=2A; T_J=25^\circ\text{C}$	-	1.0	1.5	Ω
		$V_{GS}=20V; I_D=2A; T_J=175^\circ\text{C}$	-	2.2	-	
Transconductance	G_{fs}	$V_{GS}=20V; I_D=2A; T_J=25^\circ\text{C}$	-	0.75	-	S
		$V_{GS}=20V; I_D=2A; T_J=175^\circ\text{C}$	-	0.79	-	
Dynamic characteristics (at $T_C=25^\circ\text{C}$ unless otherwise specified)						
Input Capacitance	C_{iss}	$V_{DS}=1200V; f=1\text{MHz}; V_{GS}=0V$ $T_J=25^\circ\text{C}$	-	313	-	μF
Output Capacitance	C_{oss}		-	15	-	
Reverse Transfer Capacitance	C_{rss}		-	5.6	-	
Coss Stored Energy	E_{oss}		-	13	-	
Turn on Switching Energy	E_{on}	$V_{DD}=1200V; V_{GS}=-5/20V;$ $I_D=2A; R_{g(ext)}=2.5\Omega$	-	89	-	μJ
Turn off Switching Energy	E_{off}		-	30	-	
Total Gate Charge	Q_G	$V_{DD}=1200V; V_{GS}=-5/20V;$ $I_D=2A; T_J=25^\circ\text{C}$	-	33	-	nC
Gate-Source Charge	Q_{GS}		-	5.6	-	
Gate-Drain Charge	Q_{GD}		-	12	-	
Internal Gate Resistor	R_{Gint}	$f=1\text{MHz}; V_{AC}=25\text{mV}$	-	2.6	-	Ω
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=1200V; V_{GS}=-5/20V;$ $I_D=2A; R_{g(ext)}=2.5\Omega$	-	6	-	ns
Rise Time	t_r		-	15	-	
Turn-off Delay Time	$t_{d(off)}$		-	15	-	
Fall Time	t_f		-	96	-	

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

Parameter	Symbol	Conditions	Values			Units
			Min.	Typ.	Max.	
Diode Forward Voltage	V_{FSD}	$V_{GS}=-5V; I_F=1A; T_J=25^\circ\text{C}$	-	9.0	-	V
Continuous Diode Forward Current	I_S	$T_C=25^\circ\text{C}$	-	3.8	-	A
Reverse Recovery Time	t_{RR}	$V_R=1200V; V_{GS}=0V; I_F=2A;$ $di/dt=1000A/\mu\text{s}$	-	7.0	-	ns
Reverse Recovery Charge	Q_{RR}		-	26	-	nC
Peak Reverse Recovery Current	I_{RRM}		-	6.3	-	A

Typical Characteristics

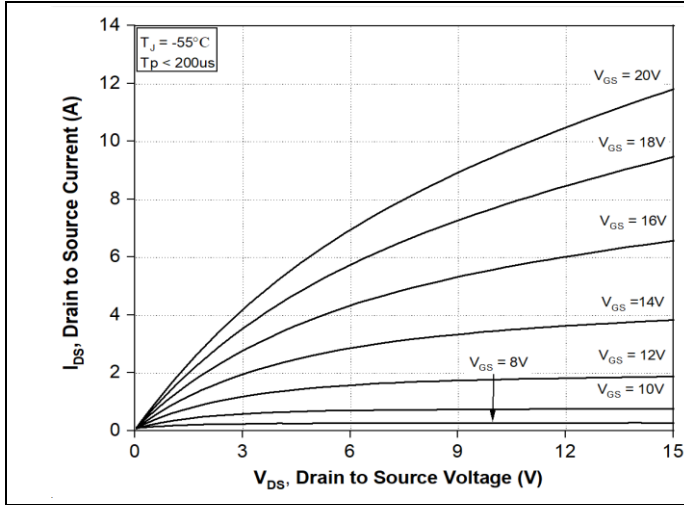


Figure 1. Output Characteristics $T_J = -55^\circ\text{C}$

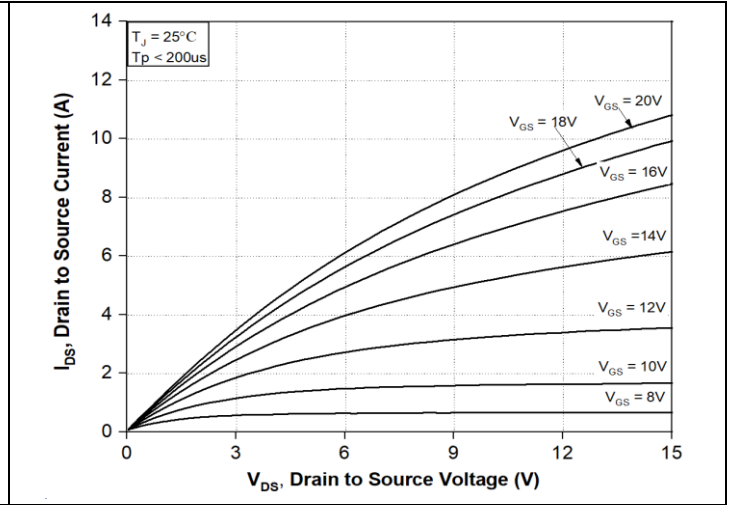


Figure 2. Output Characteristics $T_J = 25^\circ\text{C}$

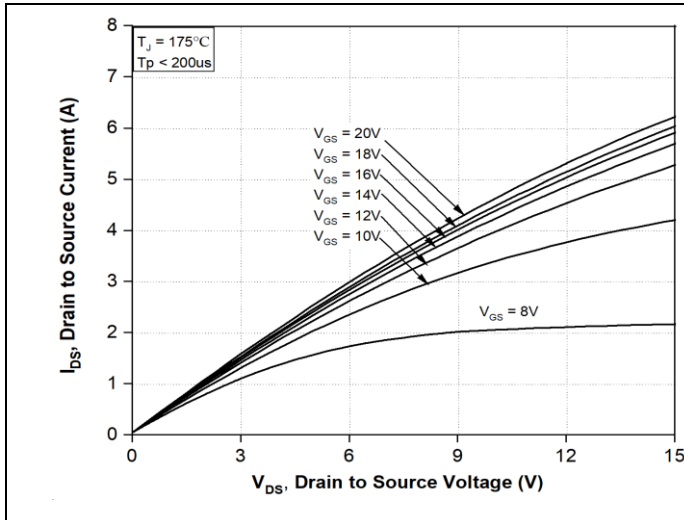


Figure 3. Output Characteristics $T_J = 175^\circ\text{C}$

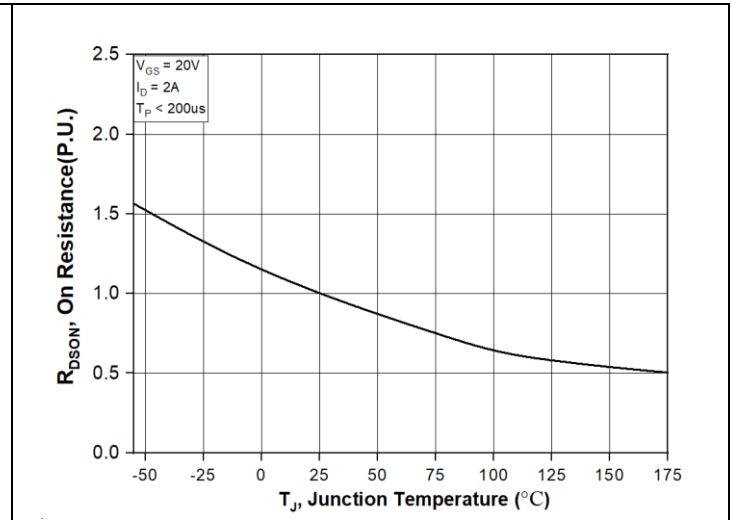


Figure 4. Normalized On-Resistance vs. Temperature

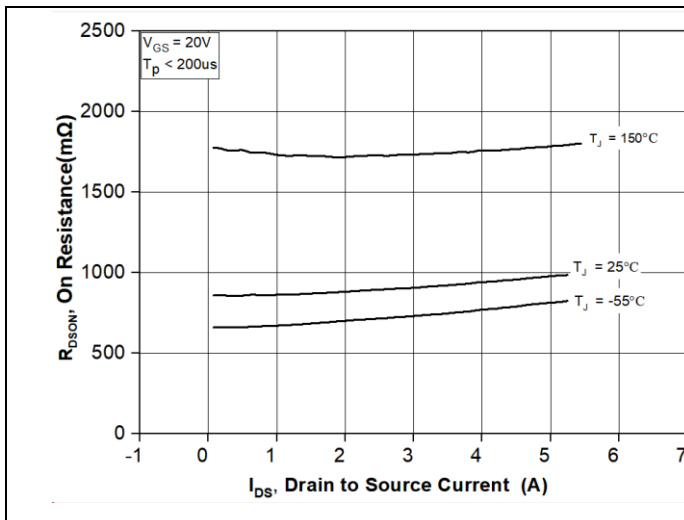


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

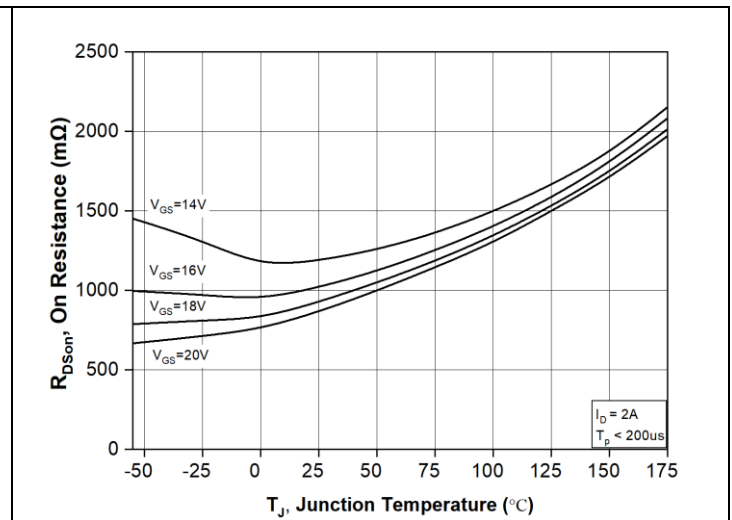


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

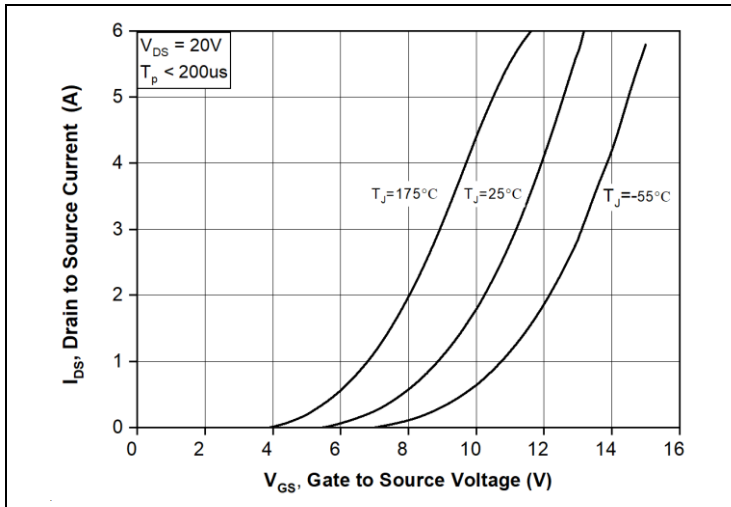


Figure 7. Transfer Characteristic for Various Junction Temperatures

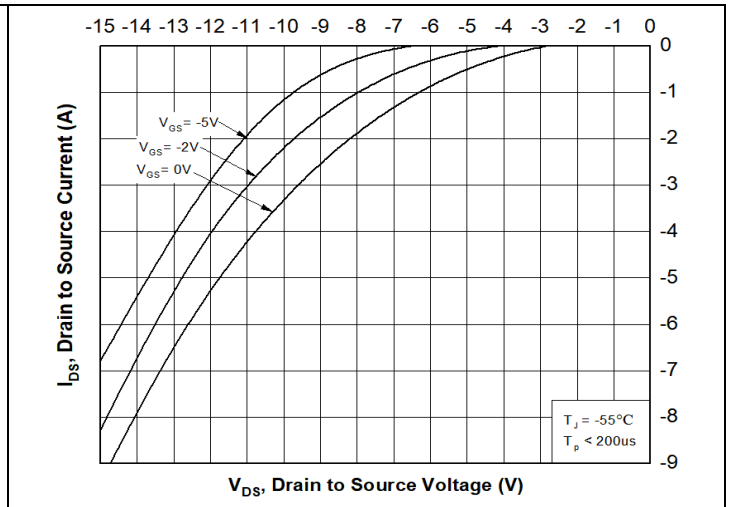


Figure 8. Body Diode Characteristic at $T_J = -55^\circ\text{C}$

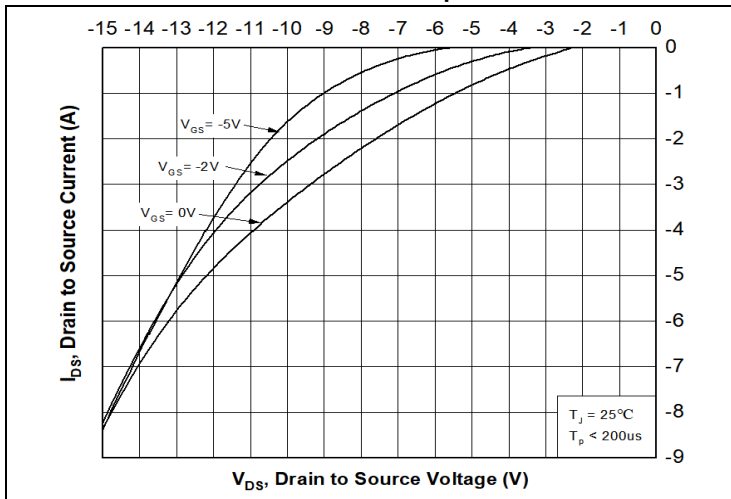


Figure 9. Body Diode Characteristic at $T_J = 25^\circ\text{C}$

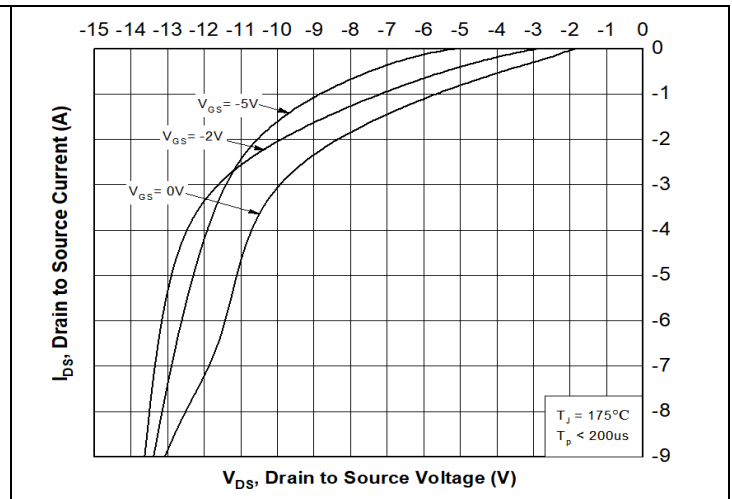


Figure 10. Body Diode Characteristic at $T_J = 175^\circ\text{C}$

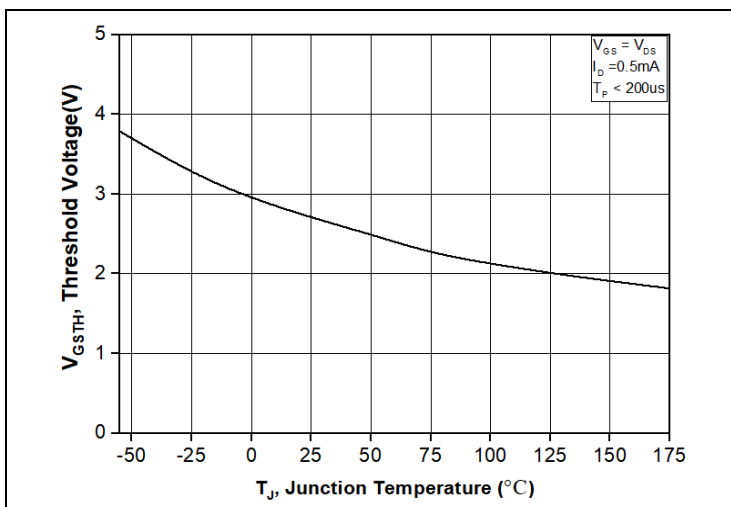


Figure 11. Threshold Voltage vs. Temperature

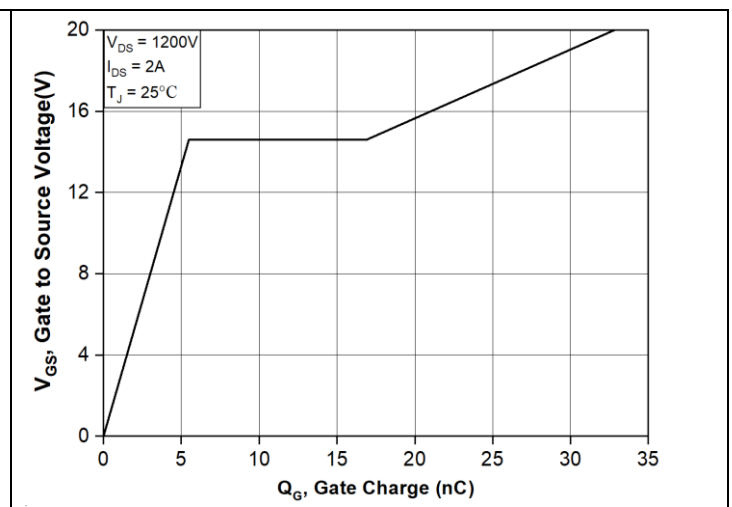


Figure 12. Gate Charge Characteristic

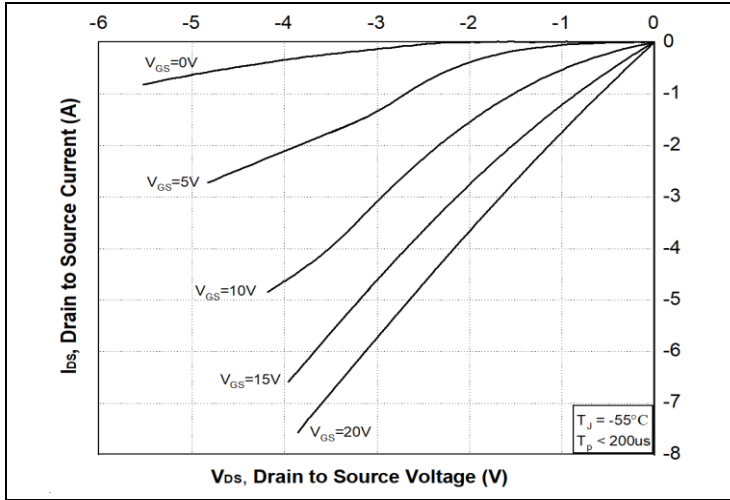


Figure 13. 3rd Quadrant Characteristic at $T_J = -55^\circ\text{C}$

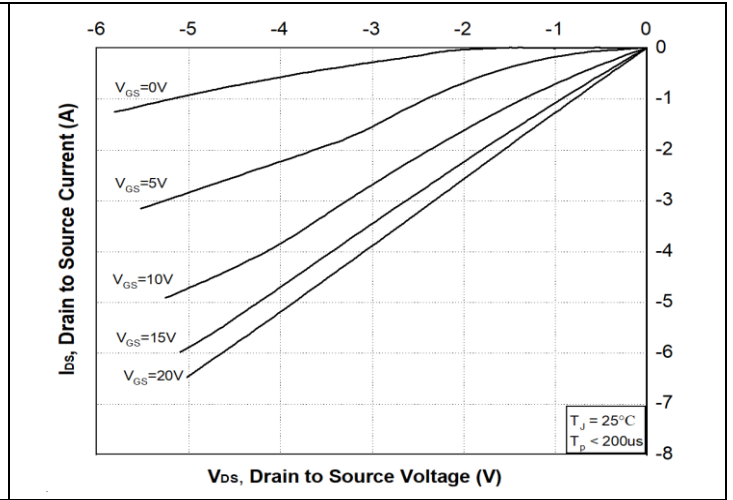


Figure 14. 3rd Quadrant Characteristic at $T_J = 25^\circ\text{C}$

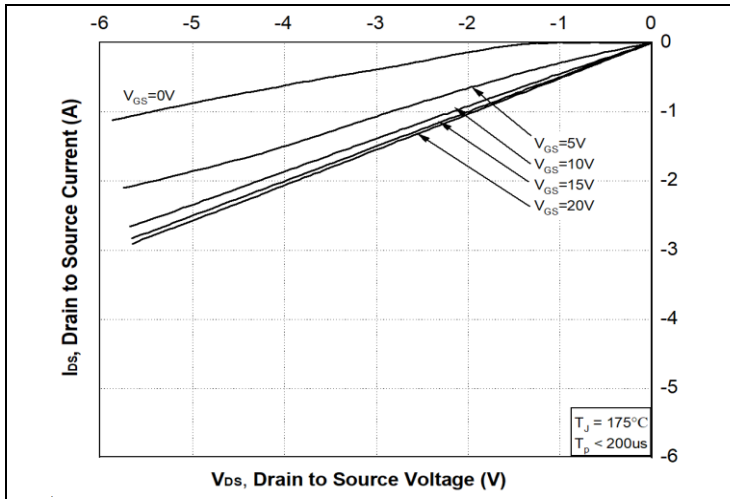


Figure 15. 3rd Quadrant Characteristic at $T_J = 175^\circ\text{C}$

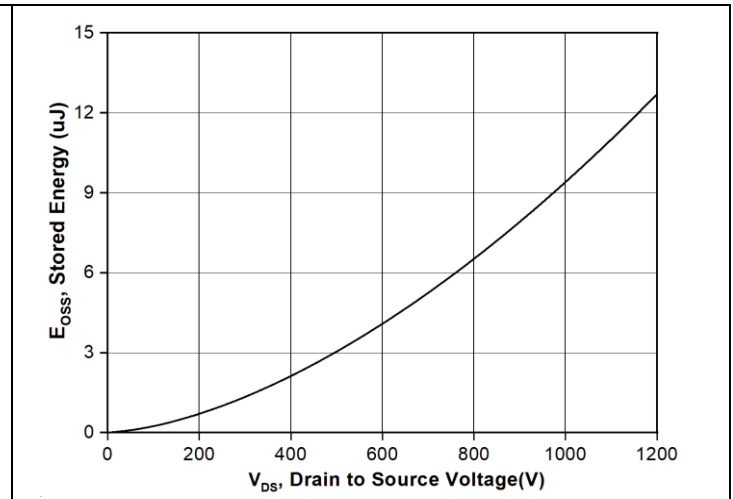


Figure 16. Output Capacitor Stored Energy

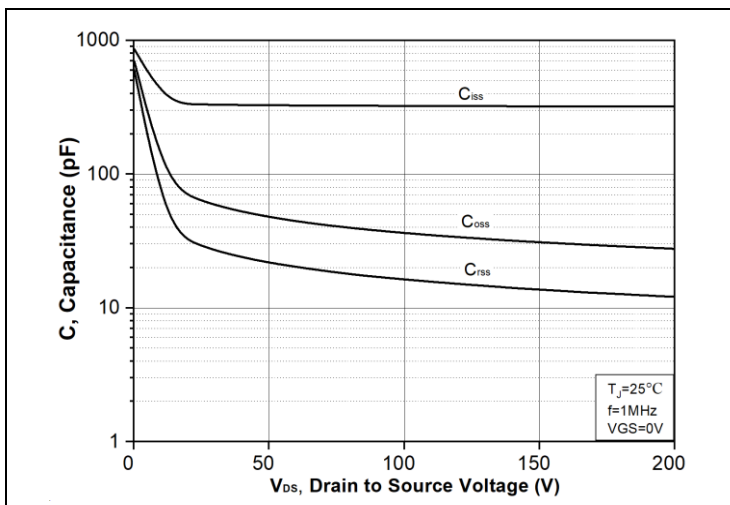


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

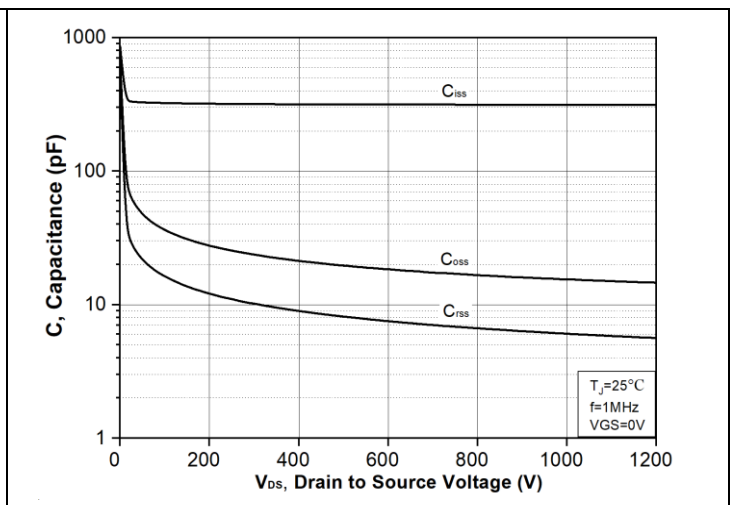


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 1200V)

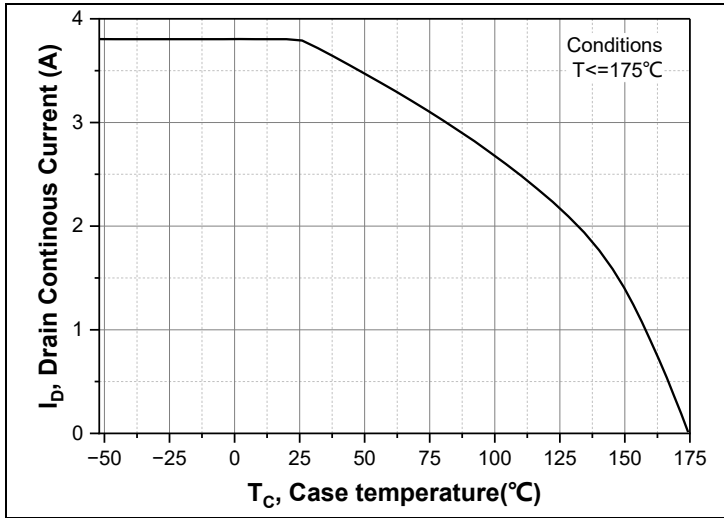


Figure 19. Continuous Drain Current Derating vs. Case Temperature

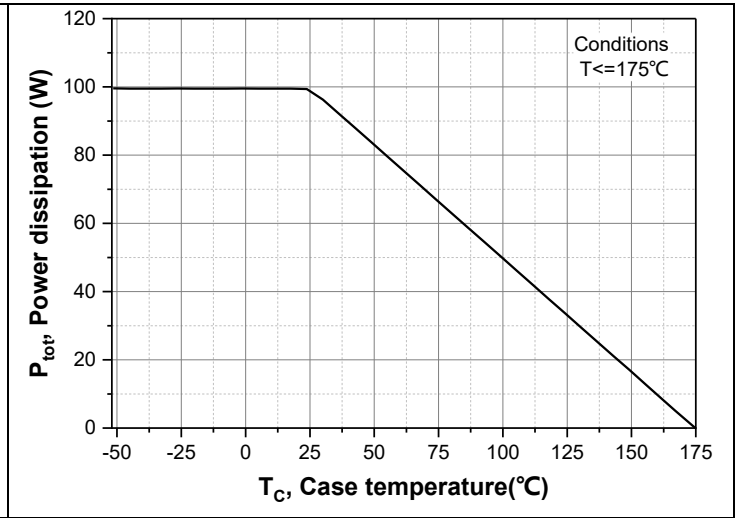


Figure 20. Maximum Power Dissipation Derating vs. Case Temperature

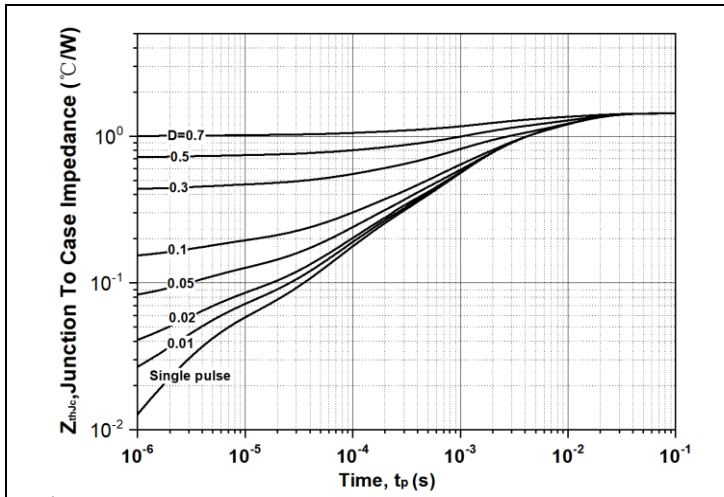


Figure 21. Transient Thermal Impedance (Junction - Case)

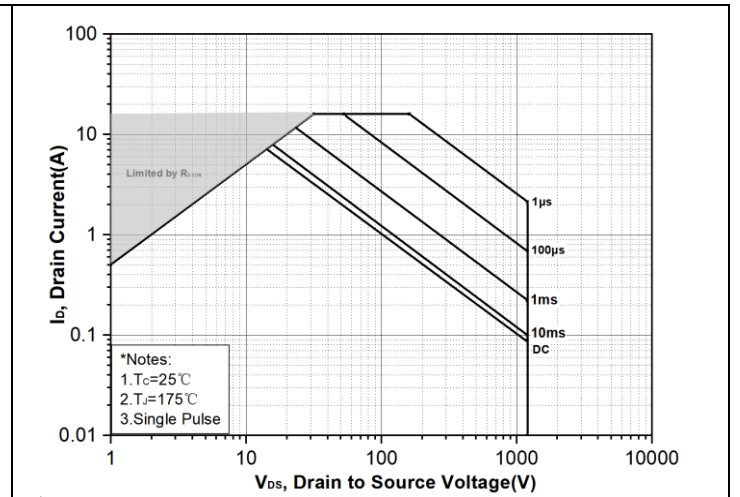


Figure 22. Safe Operating Area

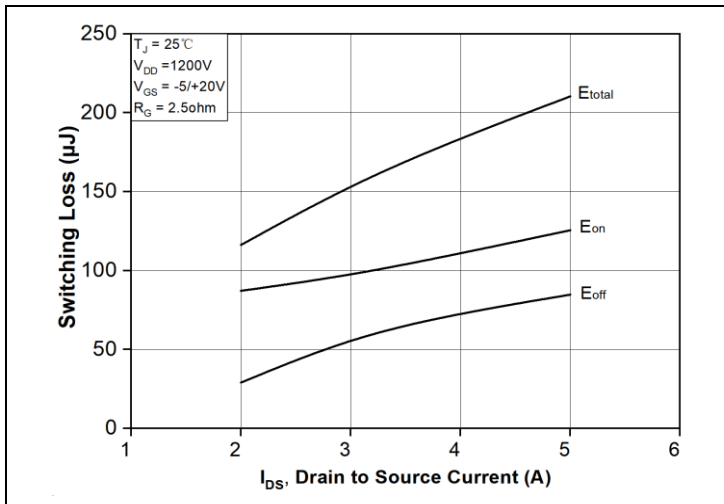


Figure 23. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 1200V$)

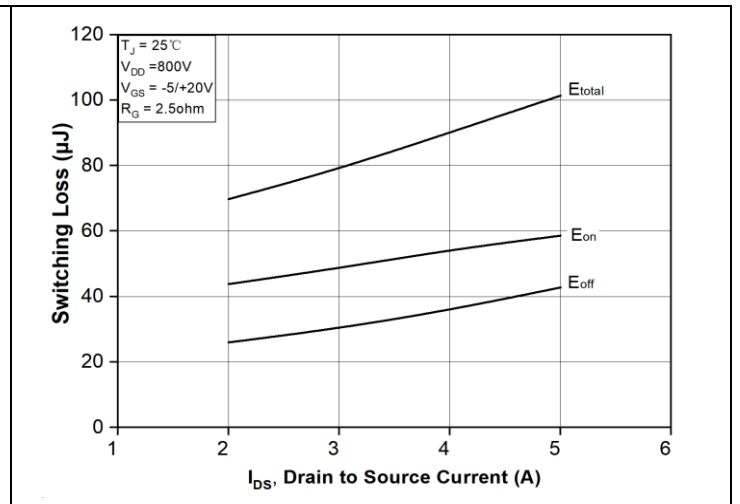


Figure 24. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 800V$)

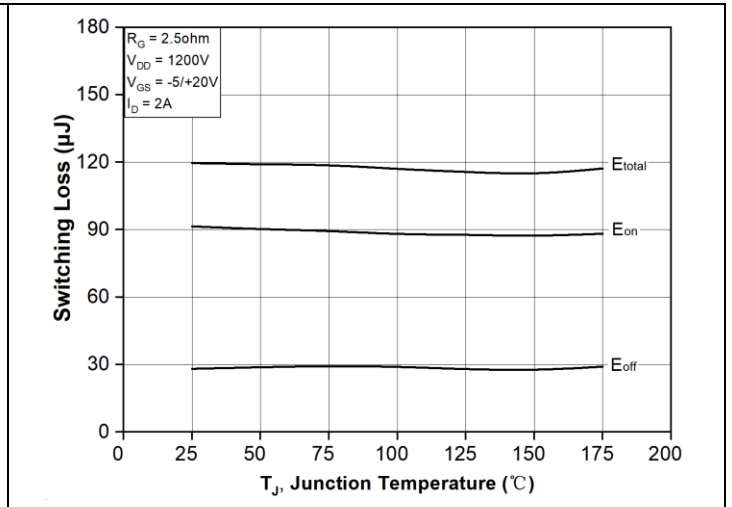
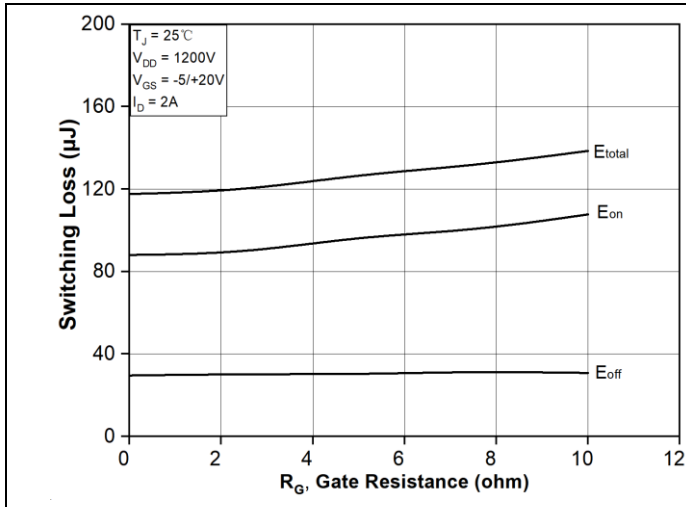


Figure 25. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

Figure 26. Clamped Inductive Switching Energy vs. Temperature

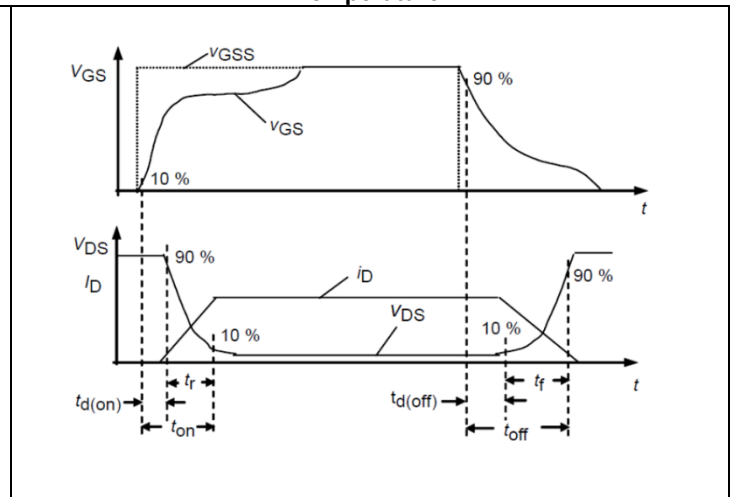
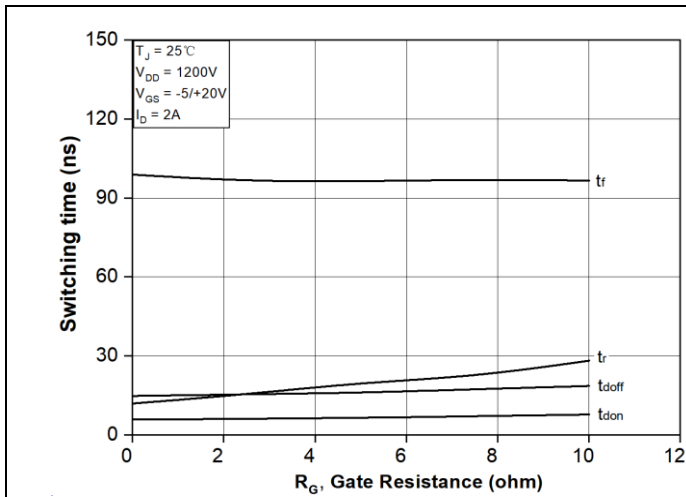
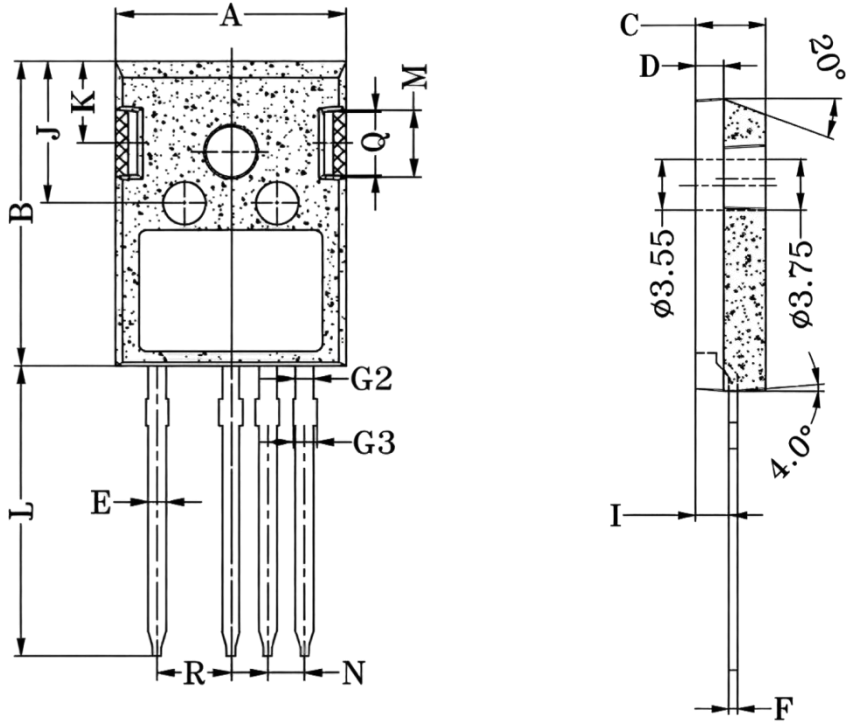


Figure 27. Switching Times vs. $R_{G(ext)}$

Figure 28. Switching Times Definition

Package Outlines(Unit:mm)

TO-247-4L



Symbol	Dimensions in Millimeter	
	MIN	MAX
A	15.80	16.00
B	20.90	21.10
C	4.90	5.10
D	1.90	2.10
E	1.10	1.30
F	0.50	0.70
G2	1.10	1.30
G3	1.18	1.38
H	4.18	4.38
I	2.30	2.50
J	9.65	9.85
K	5.54	5.74
L	19.80	20.20
M	4.50	4.70
N	2.34	2.74
ϕP	3.40	3.60
Q	4.232	4.432
R	4.88	5.28

***Important Usage Information and Disclaimer**

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