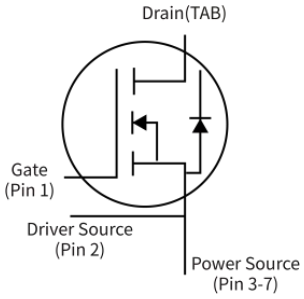
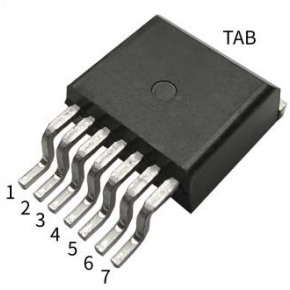
Silicon Carbide Power MOSFET

Parameter	Value	Unit
V_{DS}	3300	V
I_D	4	A
$R_{DS(ON)}$	1.0	Ω
Q_G	33	nC





TO-263-7L

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℃ 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;Tc=25°C) V_{GS}=20V	I_D	4	A
Drain Current (continuous;Tc=100°C) V_{GS}=20V		2.5	
Drain Current (pulsed)	I_{DM}	16	A
Power Dissipation (Tc=25°C, T_J=175°C)	P_D	105	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175	°C
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.43	°C/W
Thermal Resistance From Junction to Ambient	$R_{\theta JA}$	55	

Electrical Characteristics

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Static characteristics (at T_C=25°C unless otherwise specified)						
Drain-Source Breakdown Voltage	B_{VDS}	V_{GS}=0V; I_D=100uA	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=0.5mA; T_J=25°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°C	-	1.0	1.5	Ω
		V_{GS}=20V; I_D=2A; T_J=175°C	-	2.2	-	
Transconductance	G_{fs}	V_{GS}=20V; I_D=2A; T_J=25°C	-	0.75	-	S
		V_{GS}=20V; I_D=2A; T_J=175°C	-	0.79	-	
Dynamic characteristics (at T_C=25°C unless otherwise specified)						
Input Capacitance	C_{iss}	V_{DS}=1200V; f=1MHz; V_{GS}=0V T_j=25°C	-	313	-	pF
Output Capacitance	C_{oss}		-	15	-	
Reverse Transfer Capacitance	C_{rss}		-	5.6	-	
Coss Stored Energy	E_{oss}		-	13	-	uJ
Turn on Switching Energy	E_{on}	V_{DD}=1200V; V_{GS}=-5/20V; I_D=2A; R_G=2.5Ω	-	89	-	uJ
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°C	-	33	-	nC
Gate-Source Charge	Q_{GS}		-	5.6	-	
Gate-Drain Charge	Q_{GD}		-	12	-	
Internal Gate Resistor	R_{Gint}	f=1MHz; V_{AC}=25mV	-	2.6	-	Ω
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=1200V; V_{GS}=-5/20V; I_D=2A; R_G=2.5Ω	-	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℃ 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°C	-	9.0	11	V
Continuous Diode Forward Current	I_S	T_C=25°C	-	4	-	A
Reverse Recovery Time	t_{RR}	V_R=1200V; V_{GS}=0V; I_F=2A; di/dt=1000A/μs	-	7.0	-	ns
Reverse Recovery Charge	Q_{RR}		-	26	-	nC
Peak Reverse Recovery Current	I_{RRM}		-	6.3	-	A

Typical Characteristics

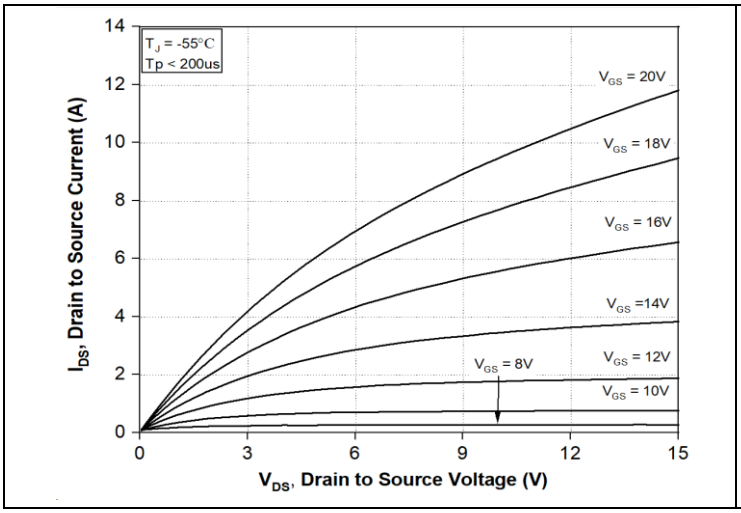


Figure 1. Output Characteristics T_J = -55 °C

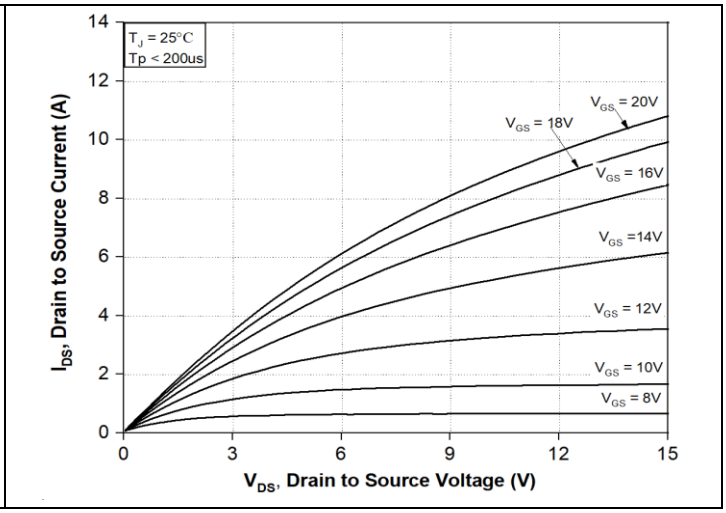


Figure 2. Output Characteristics T_J = 25 °C

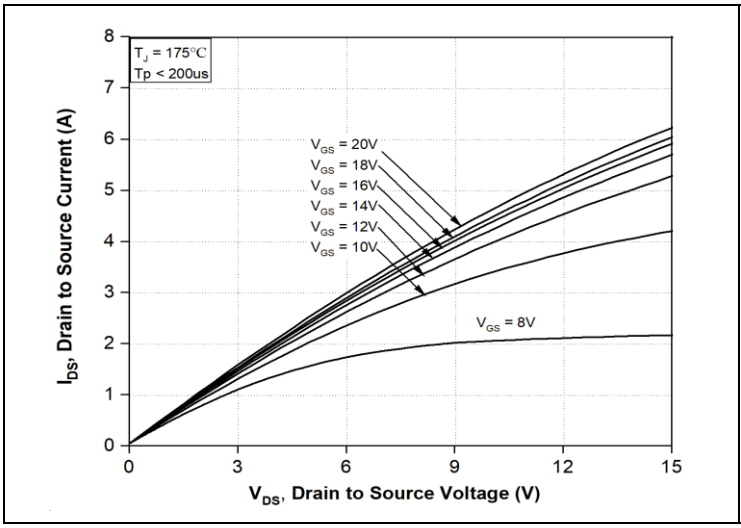


Figure 3. Output Characteristics T_J = 175°C

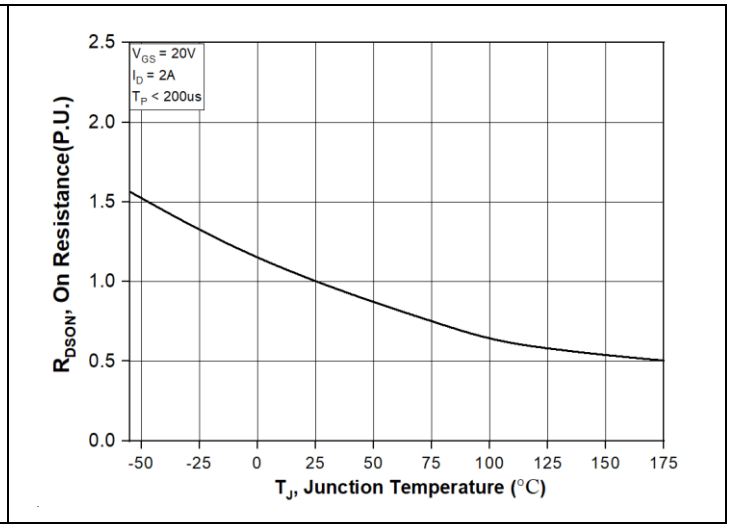


Figure 4. Normalized On-Resistance vs. Temperature

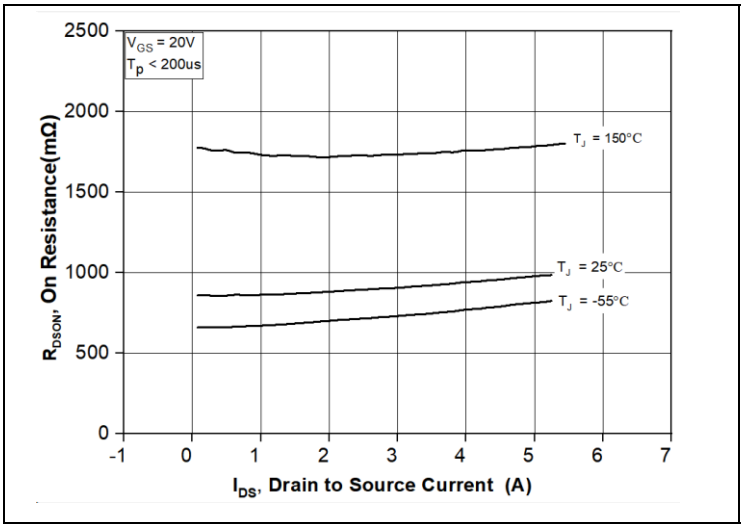


Figure 5. On-Resistance vs. Drain Current
For Various Temperatures

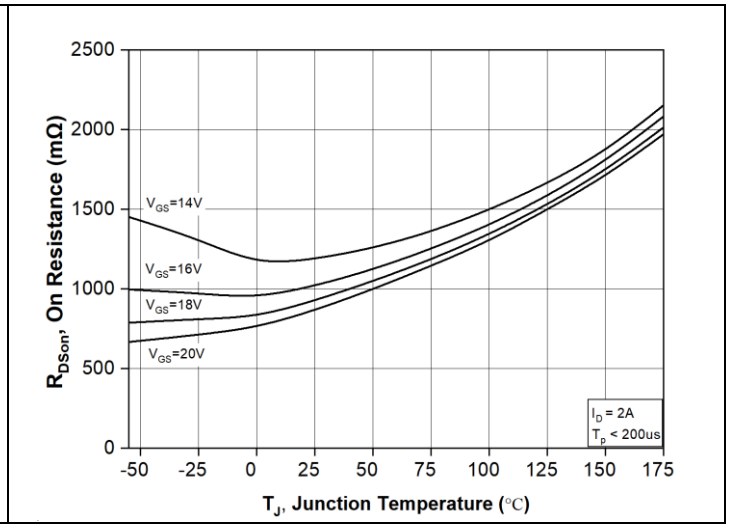


Figure 6. On-Resistance vs. Temperature
For Various Gate Voltage

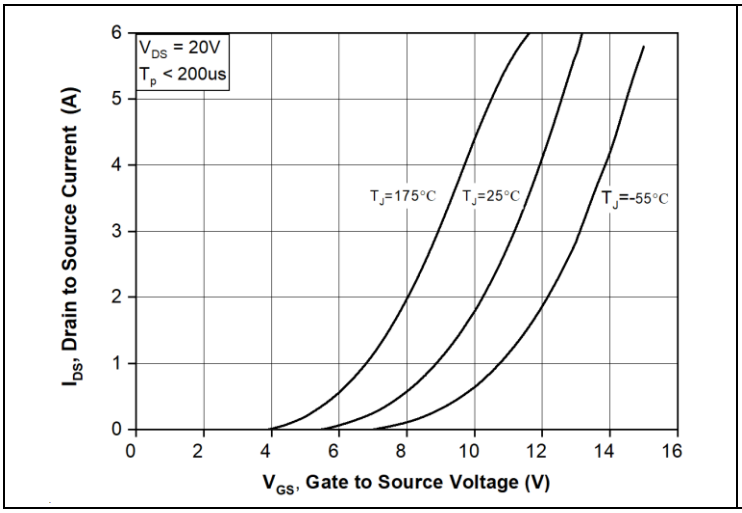


Figure 7. Transfer Characteristic for Various Junction Temperatures

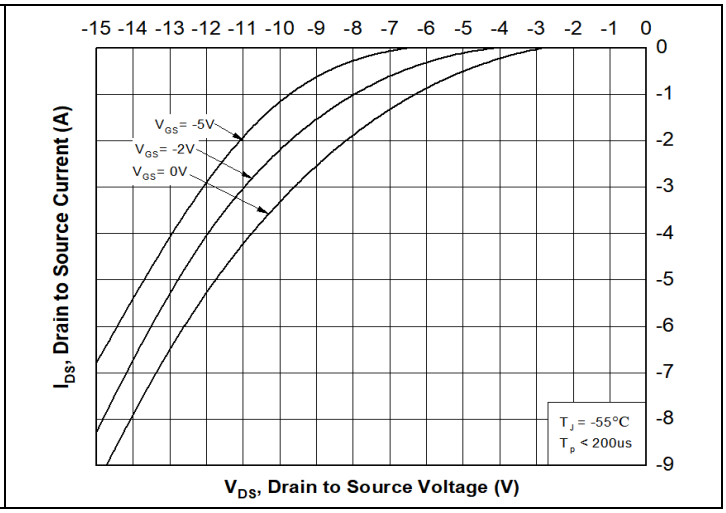


Figure 8. Body Diode Characteristic at T_J = -55 °C

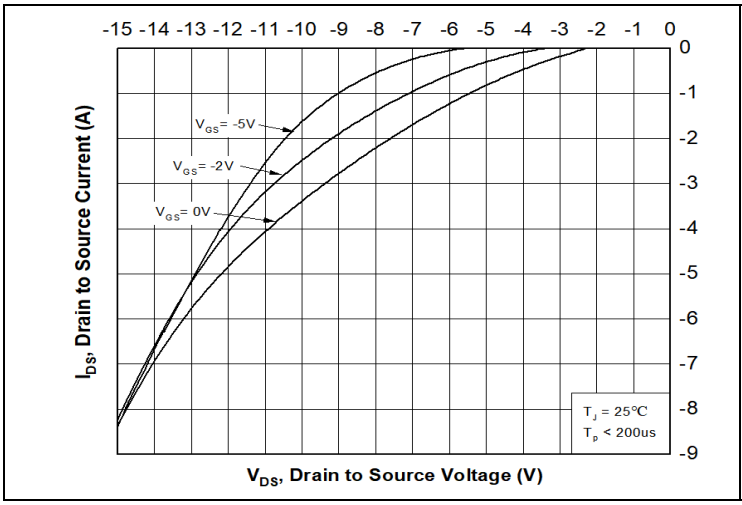


Figure 9. Body Diode Characteristic at T_J = 25 °C

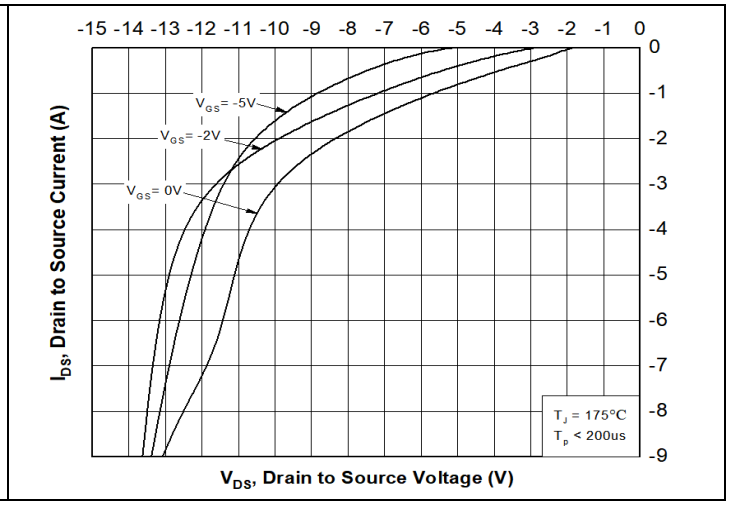


Figure 10. Body Diode Characteristic at T_J = 175 °C

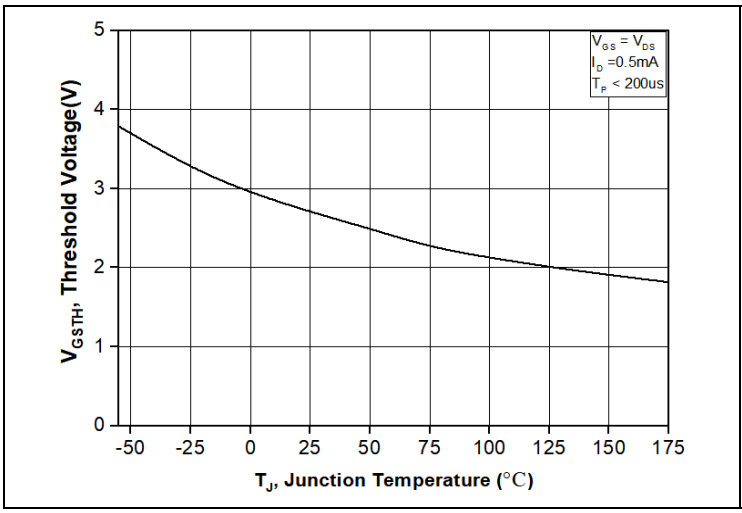


Figure 11. Threshold Voltage vs. Temperature

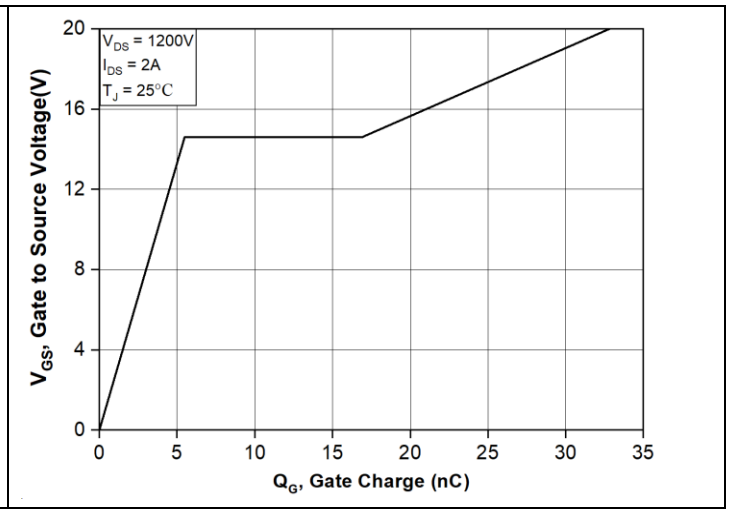


Figure 12. Gate Charge Characteristic

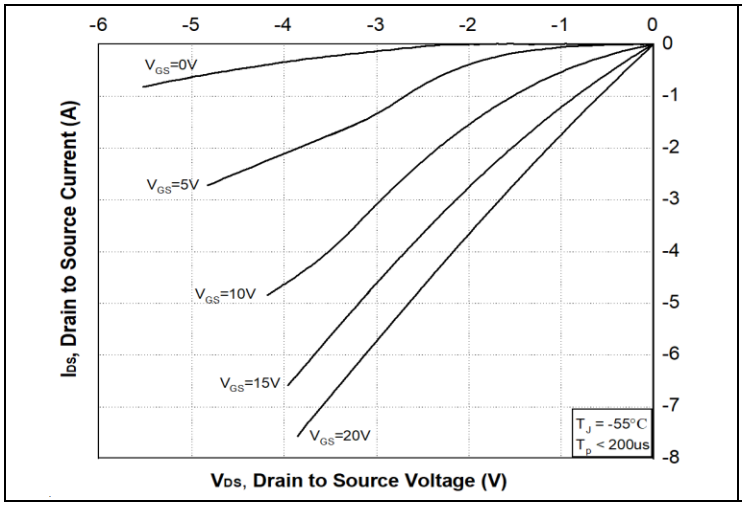


Figure 13. 3rd Quadrant Characteristic at T_J = -55 °C

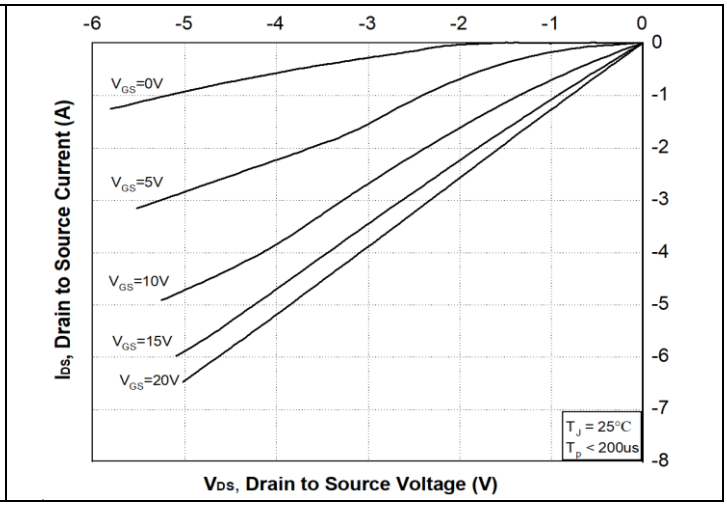


Figure 14. 3rd Quadrant Characteristic at T_J = 25 °C

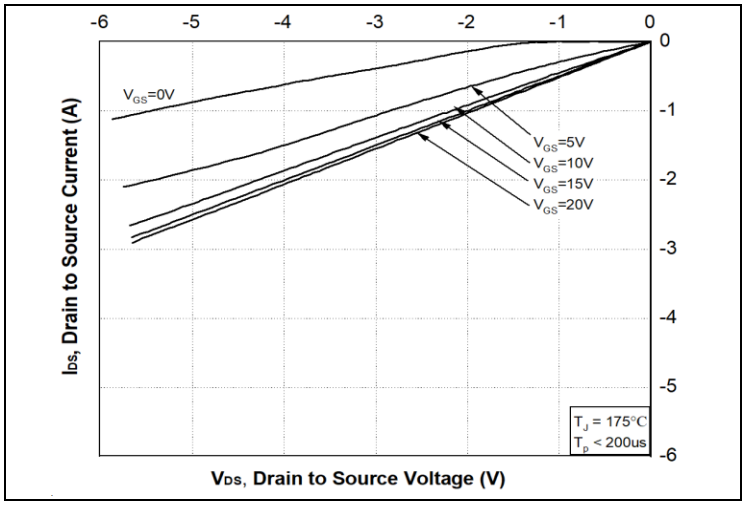


Figure 15. 3rd Quadrant Characteristic at T_J = 175°C

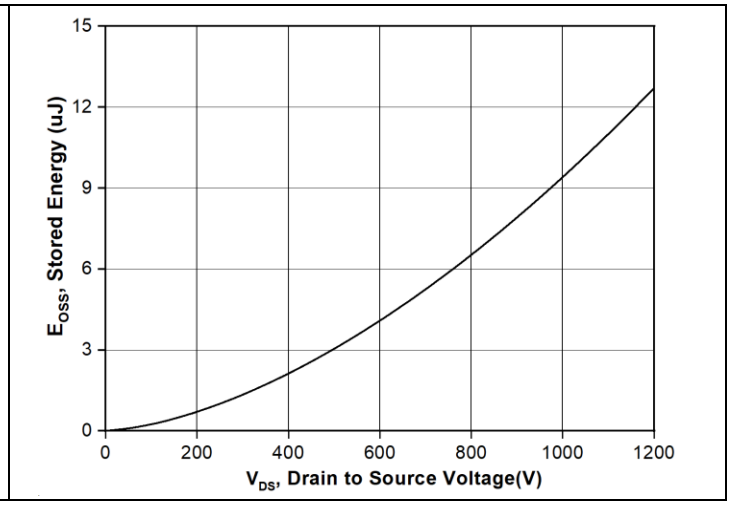


Figure 16. Output Capacitor Stored Energy

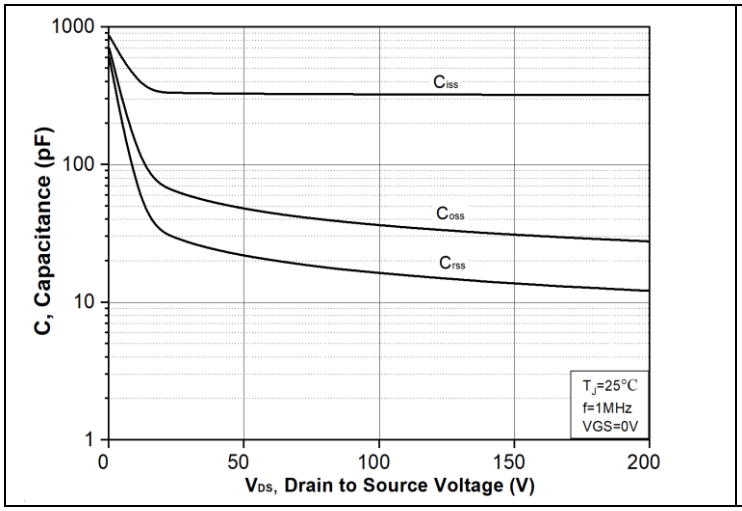


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

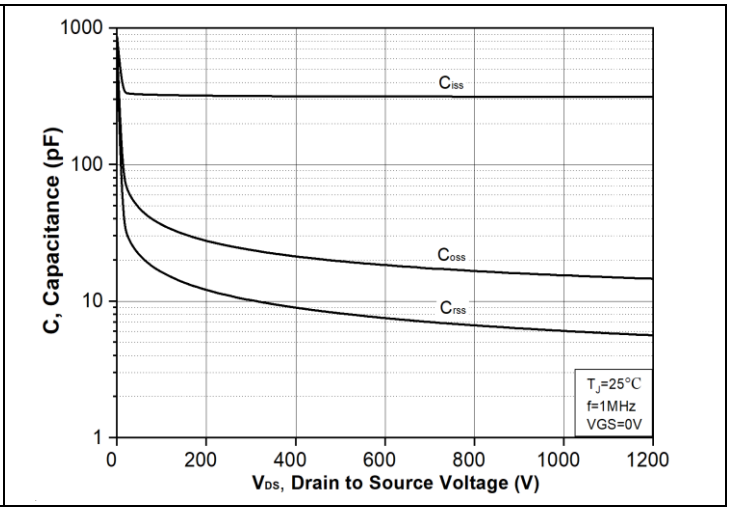


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 1200V)

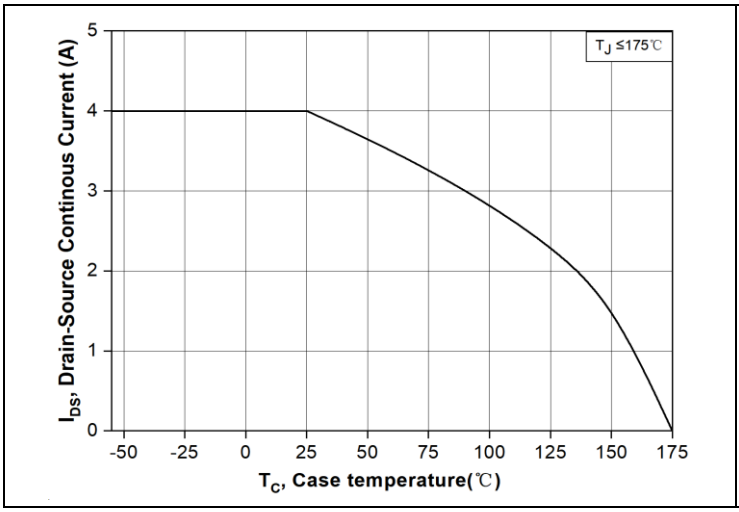


Figure 19. Continuous Drain Current Derating vs. Case Temperature

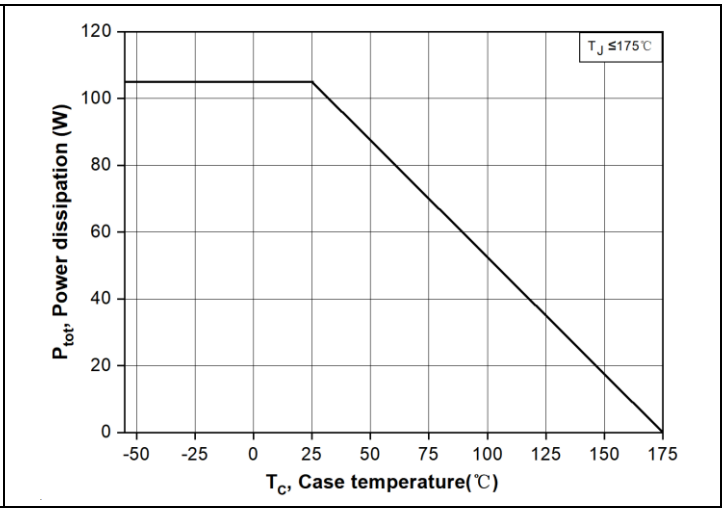


Figure 20. Maximum Power Dissipation Derating vs. Case Temperature

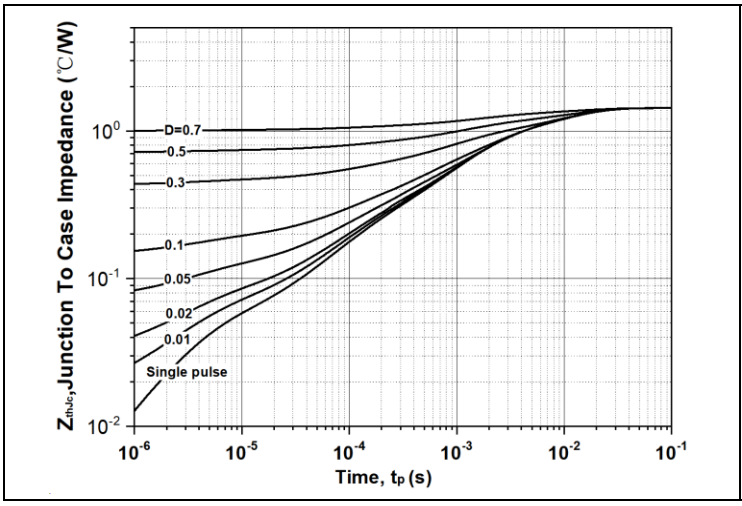


Figure 21. Transient Thermal Impedance (Junction - Case)

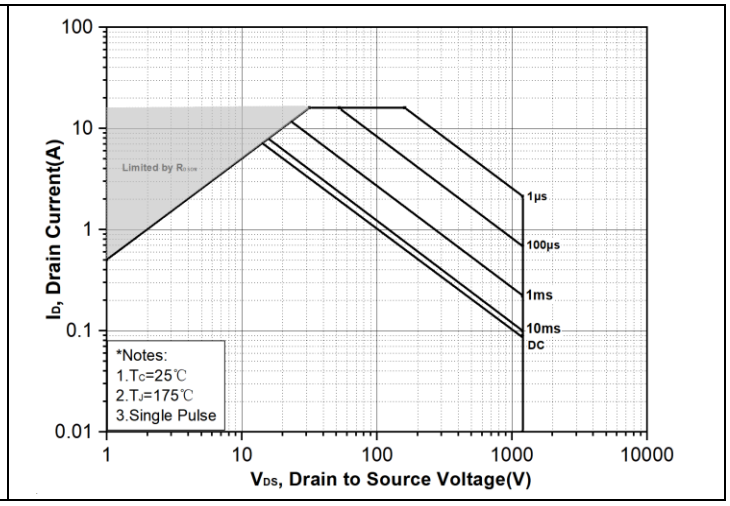


Figure 22. Safe Operating Area

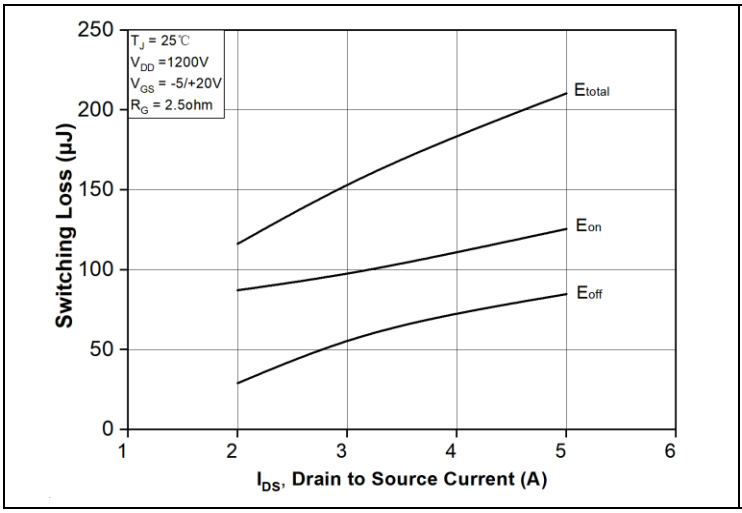


Figure 23. Clamped Inductive Switching Energy vs. Drain Current (V_{DD} =1200V)

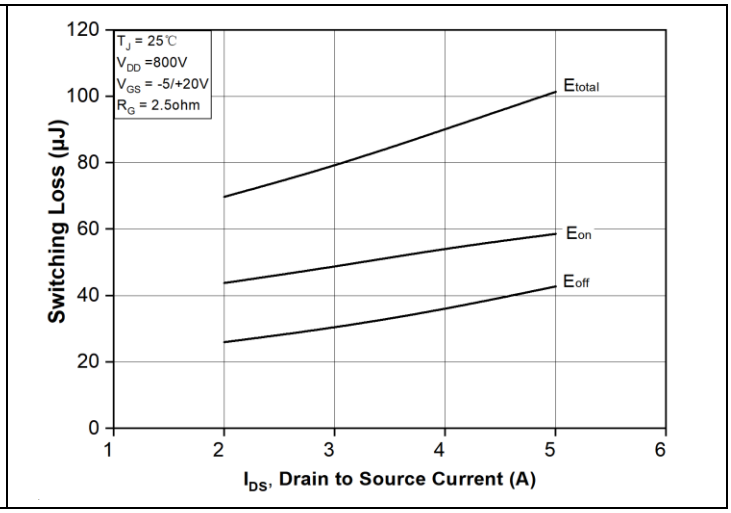


Figure 24. Clamped Inductive Switching Energy vs. Drain Current (V_{DD} = 800V)

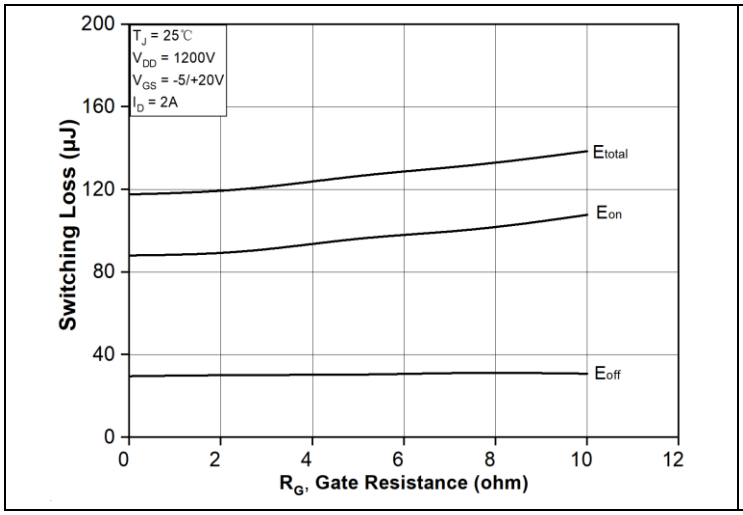


Figure 25. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

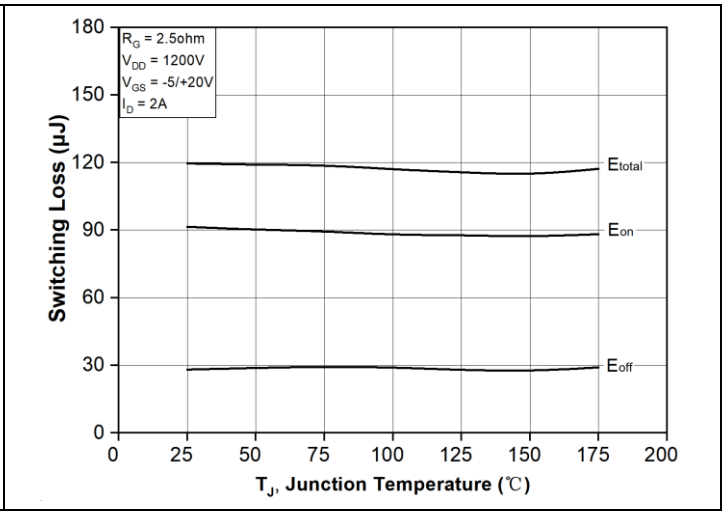


Figure 26. Clamped Inductive Switching Energy vs. Temperature

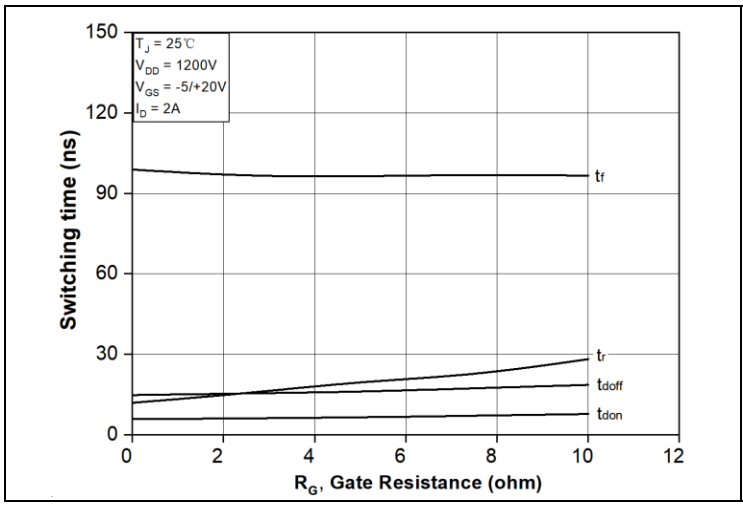


Figure 27. Switching Times vs. $R_{G(ext)}$

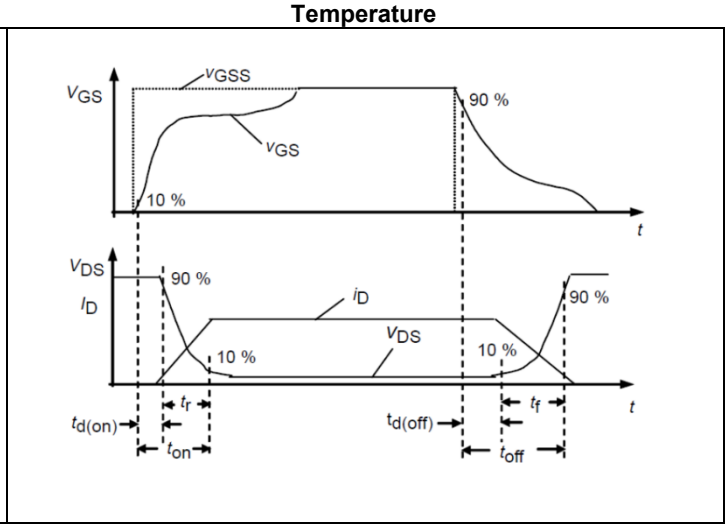
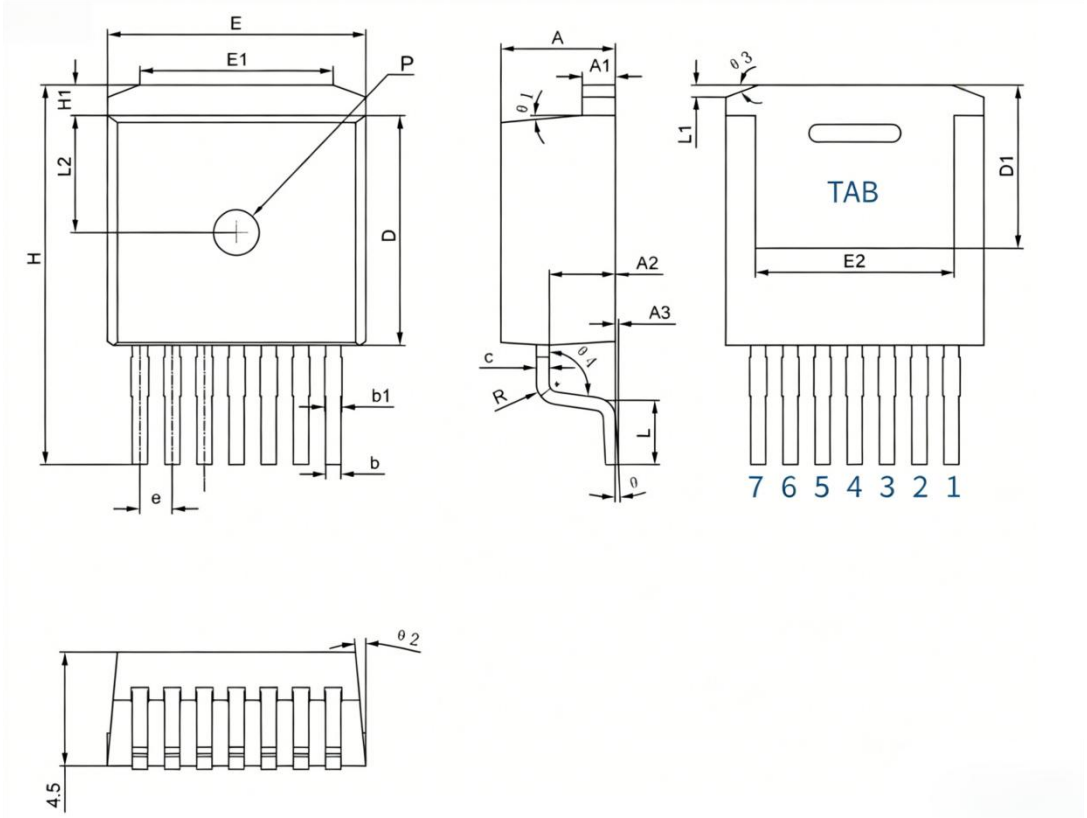


Figure 28. Switching Times Definition

Package Outlines(Unit:mm)

TO-263-7L



Symbol	Millimeters			Symbol	Millimeters		
	Min.	Type.	Max.		Min.	Type.	Max.
A	4.40	4.50	4.60	**e**	1.17	1.27	1.37
A1	1.25	1.30	1.40	**H**	14.75	15.00	15.25
A2	2.45	2.60	2.70	**H1**	1.10	1.20	1.30
A3	0.05	0.13	0.20	**L**	2.35	2.55	2.75
b	0.50	0.60	0.70	**L1**	0.37	0.57	0.77
b1	0.60	0.70	0.85	**L2**	4.48	4.63	4.78
c	0.45	0.50	0.60	**θ**	0°	3°	5°
D	8.88	9.08	9.28	**θ1**	3°	5°	7°
D1	6.25	6.45	6.65	**θ2**	3°	5°	7°
E	9.88	10.18	10.28	**θ3**	15°	20°	25°
E1	6.67	7.07	7.47	**R**	0.75	0.80	0.85
E2	7.67	7.82	7.97	**P**	1.70	1.80	1.90

Pin	Symbol	Description
1	G	Gate
2	KS	Driver Source
3-7	S	Power Source
TAB	D	Drain

Note:

1. All metal surfaces are Sn plated (matte), except area of cut.
2. Burr or mold flash size (0.5 mm) is not included in the dimensions.

***Important Usage Information and Disclaimer**

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