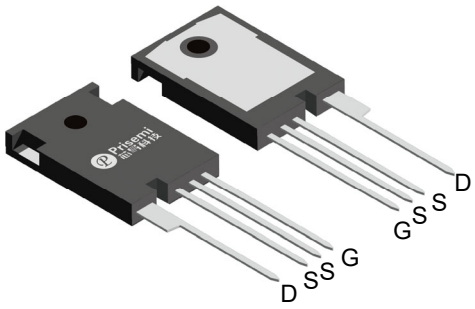
Prisemi®

PSICM4TAT120R13

SiC MOSFET

Description

MOSFET Product Summary		
V_{DS}(V)	$R_{DS(on)}$(mΩ)	I_D(A)
1200	13 mΩ@ V_{GS}= 18V	175



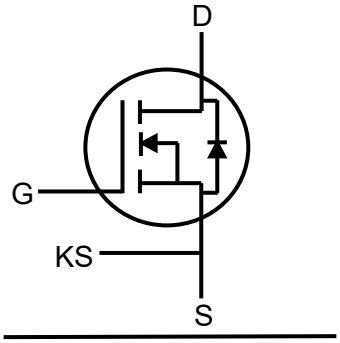
TO-247-4L (Top View)

Feature

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low RDS(on)
- Avalanche Ruggednes

Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC-DC Converters
- Battery Chargers



Schematic diagram

Absolute maximum rating@25℃

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	1200	V
Gate-Source Voltage （Absolute maximum values）		V_{GSmax}	-8/+22	V
Gate-Source Voltage (Recommended operational values)		V_{GSop}	-4/+18	V
Continuous Drain Current	T_C=25℃	I_D	175	A
	T_C=100℃		125	
Pulsed drain current (Puls width tp limited by Tjmax)		I_{DM}	360	A
Power dissipation	T_C=25℃	P_{tot}	833	W
	T_C=100℃		416	
Operating Junction Temperature		T_J	-40 to +175	℃
Storage Temperature		T_{STG}	-40 to +175	℃

Thermal Resistance

Parameter	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	0.18	℃/W

Electrical characteristics per line@25℃ (unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Statistic Characteristics							
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V,I_D = 100μA		1200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}= 1200V,V_{GS} = 0V T_j=175°C		-	1	-	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS} = 18V,V_{DS} = 0V		-	-	250	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS},I_D = 35mA		2	2.8	4	V
		V_{DS} = V_{GS},I_D = 35mA ,T_j=175°C		-	1.9	-	
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} = 18V,I_D = 75A	T_j=25°C	-	13	19	mΩ
			T_j=175°C	-	23	-	
Dynamic Characteristics							
Input Capacitance	C_{lss}	V_{GS}=0V,V_{DS} = 1000V, f=100kHz, V_{GS}=0V		-	6893	-	pF
Output Capacitance	C_{oss}			-	249	-	
Reverse Transfer Capacitance	C_{rss}			-	19	-	
Gate Resistance	R_G	f=1MHz		-	2.4	-	Ω
Total Gate Charge	Q_g	V_{DS}=800V, I_D=75A V_{GS}=-4V/+18V		-	306	-	nC
Gate-Source Charge	Q_{gs}			-	87	-	
Gate-Drain Charge	Q_{gd}			-	80	-	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=800V, V_{GS}=-4/+18V, I_D=75A, $R_{g(ext)}$=2.5Ω, L=200μH		-	25	-	ns
Turn-on Rise Time	t_r			-	37	-	
Turn-Off Delay Time	$t_{d(off)}$			-	57	-	
Turn-Off Fall Time	t_f			-	17	-	
Turn-On Energy	E_{on}	V_{DD}=800V, V_{GS}=-4/+18V, I_D=75A, $R_{g(ext)}$=2.5Ω, L=200μH		-	1043	-	μJ
Turn-Off Energy	E_{off}			-	828	-	

Electrical characteristics per line@25℃ (unless otherwise specified)

Reverse Diode Characteristics							
Body Diode Forward Voltage	V_{SD}	V_{GS}=-4V,I_{SD}=37.5A	T_J=25°C	-	3.9	-	V
			T_J=175°C	-	3.3	-	
Continuous Diode Forward Current	I_S	V_{GS}=-4V	T_c=25°C	-	150	-	A
			T_c=100°C	-	82	-	
Reverse Recovery Time	t_{rr}	V_{GS}=-4V, V_R=800V, I_D=75A, di/dt=7000A/μs		-	15	-	ns
Reverse Recovery Charge	Q_{rr}			-	434	-	nC
Peak Reverse Recovery Current	I_{rrm}			-	51	-	A

Typical Characteristics

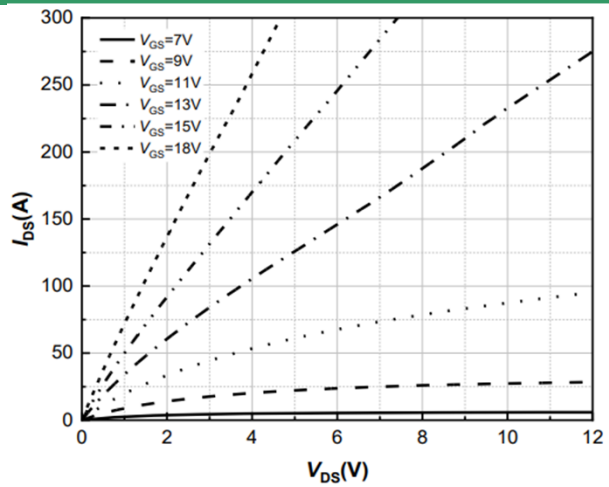


Figure 1. **Output Characteristics T_j=-40°C**

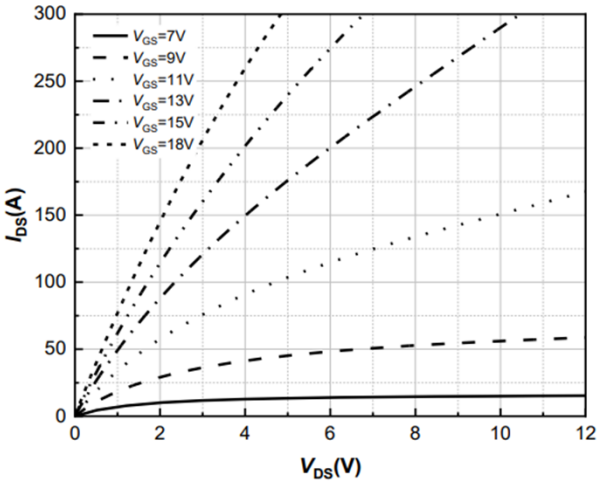


Figure 2. **Output Characteristics T_j=25°C**

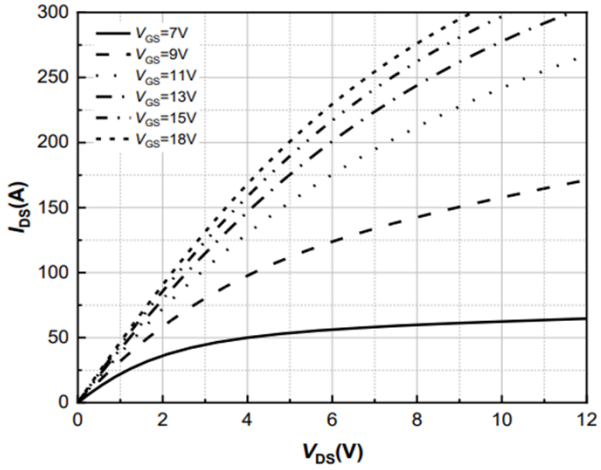


Figure 3. **Output Characteristics T_j=175°C**

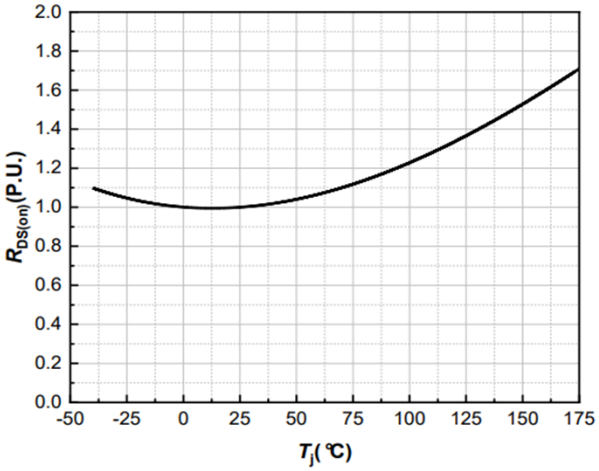


Figure 4. **Normalized On-Resistance vs. Temperature**

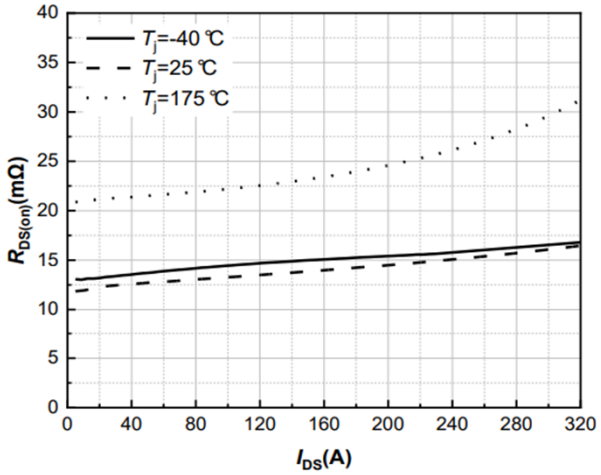


Figure 5. **On-Resistance vs. Drain Current For Various Temperatures**

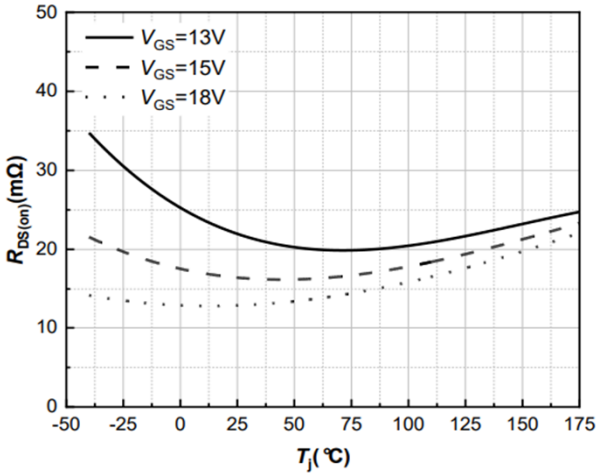


Figure 6. **On-Resistance vs. Temperature For Various Gate Voltage**

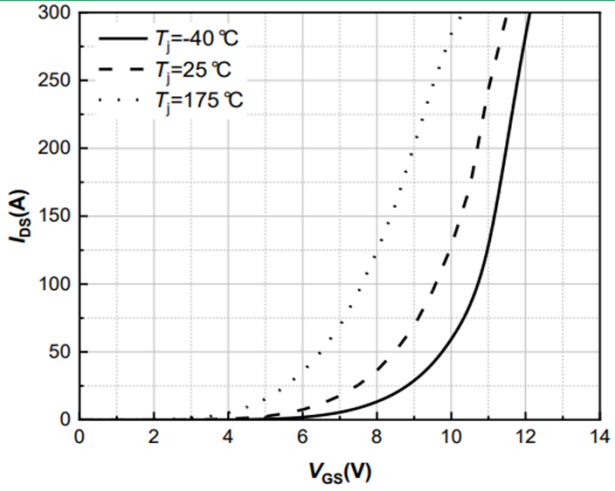


Figure 7. **Transfer Characteristic for Various Junction Temperatures V_{DS}=20V**

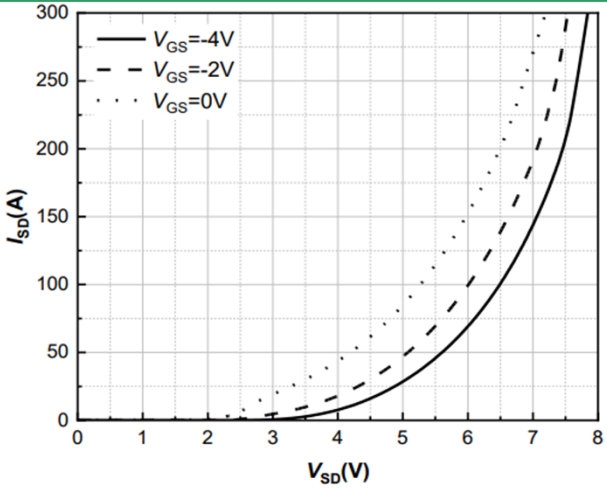


Figure 8. **Body Diode Characteristic T_j=-40°C**

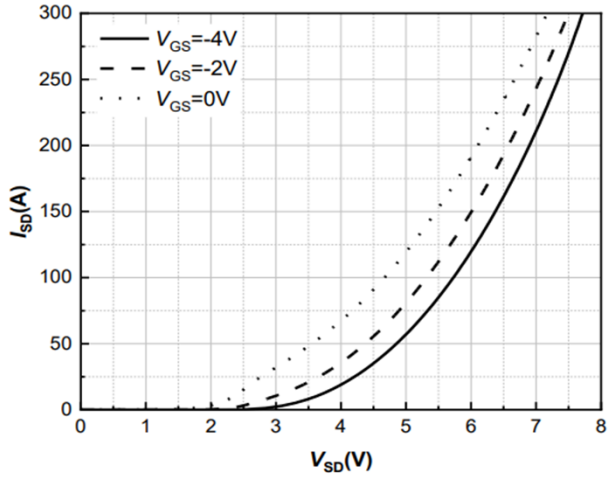


Figure 9. **Body Diode Characteristic T_j=25°C**

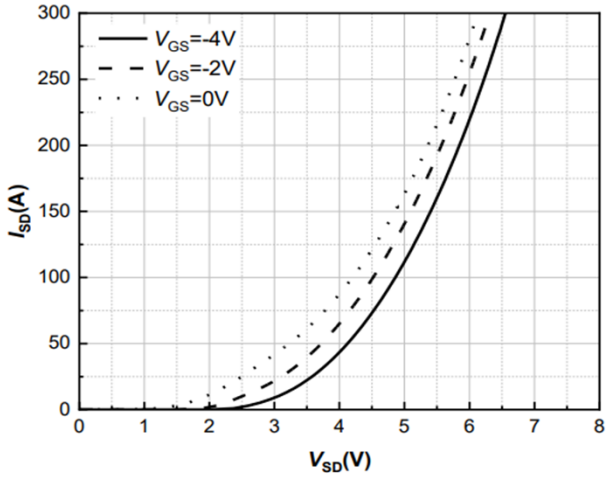


Figure 10. **Body Diode Characteristic T_j=175°C**

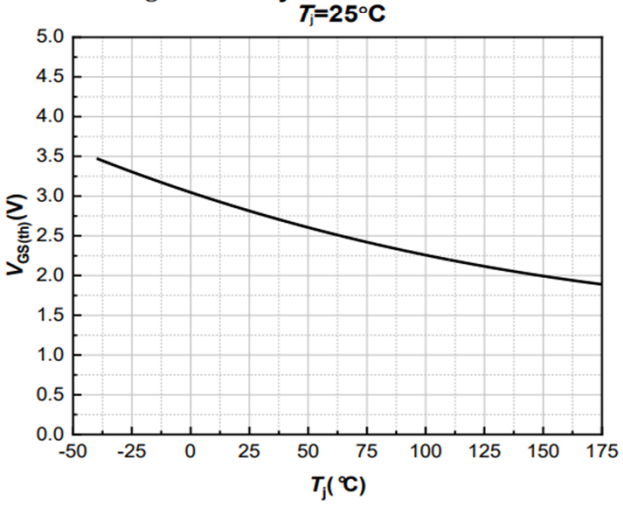


Figure 11. **Threshold Voltage vs. Temperature**

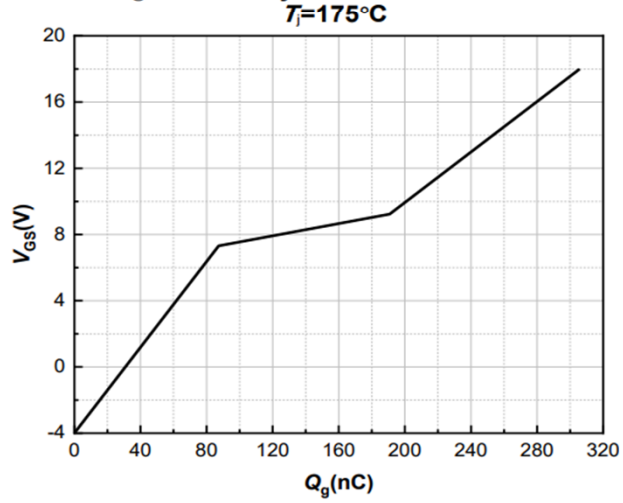


Figure 12. **Gate Charge Characteristics**

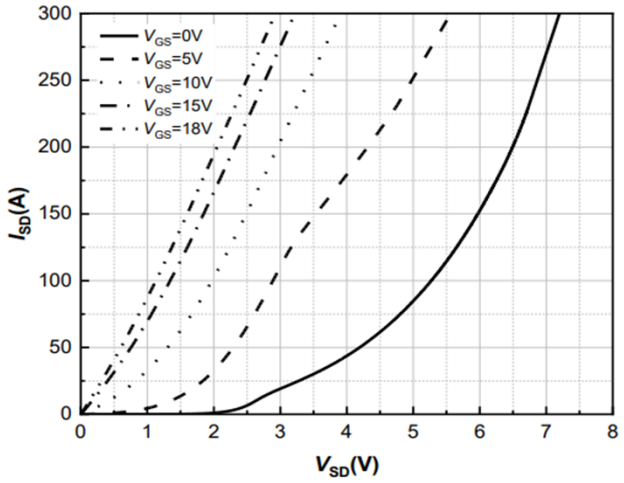


Figure 13. **3rd Quadrant Characteristic T_j=-40°C**

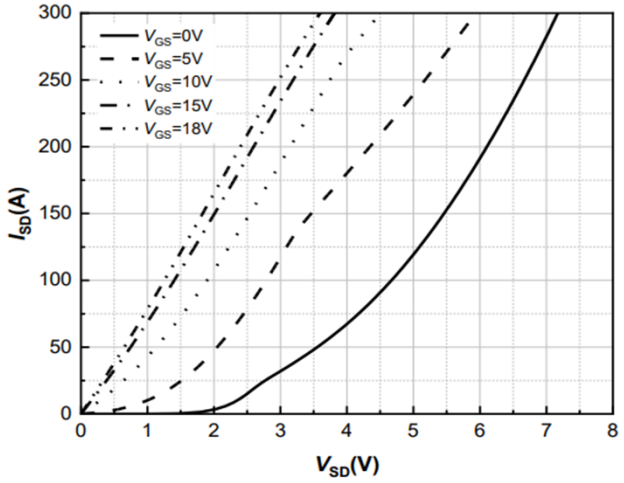


Figure 14. **3rd Quadrant Characteristic T_j=25°C**

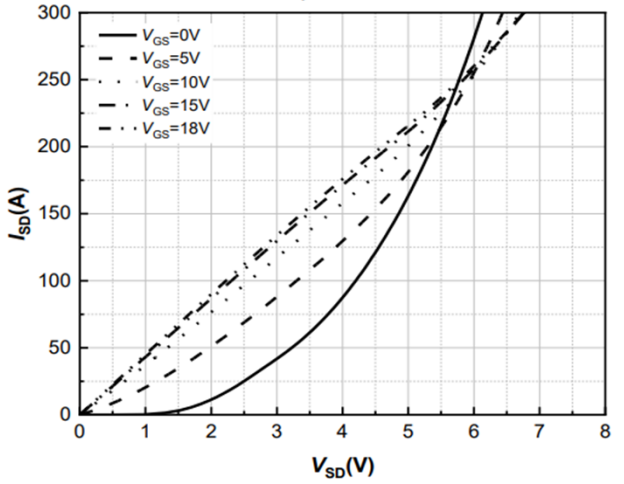


Figure 15. **3rd Quadrant Characteristic T_j=175°C**

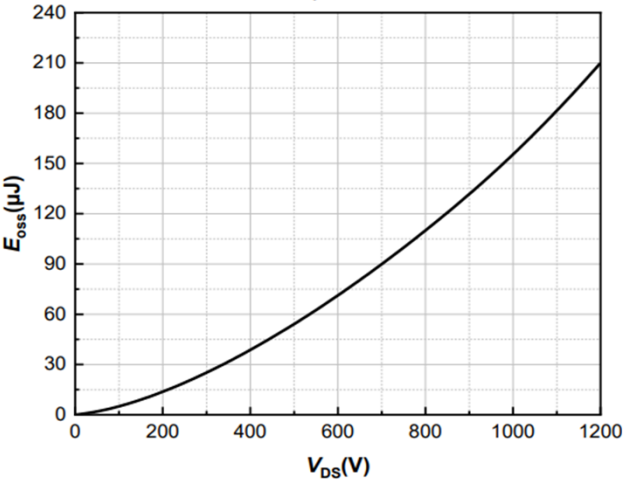


Figure 16. **Output Capacitor Stored Energy**

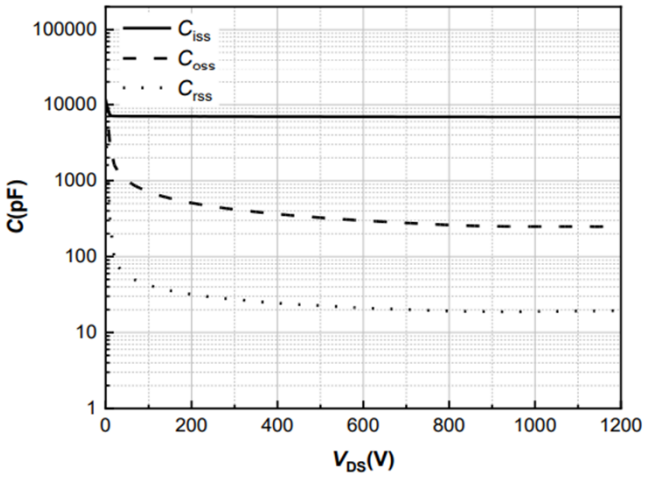


Figure 17. **Capacitances vs. Drain-Source**

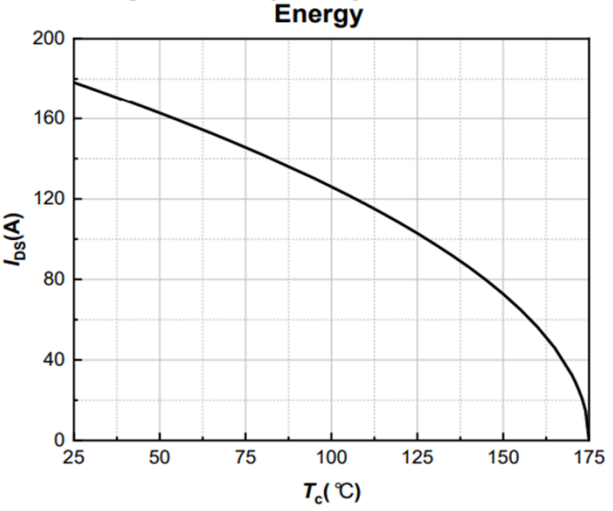


Figure 18. **Continuous Drain Current Derating vs. Case Temperature**

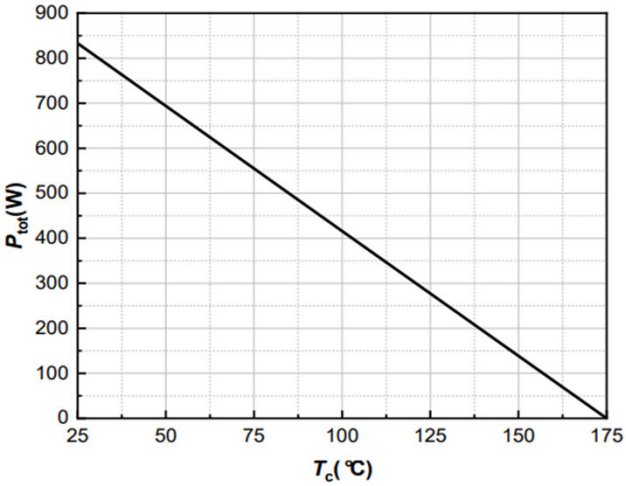


Figure 19. **Maximum Power Dissipation Derating vs. Case Temperature**

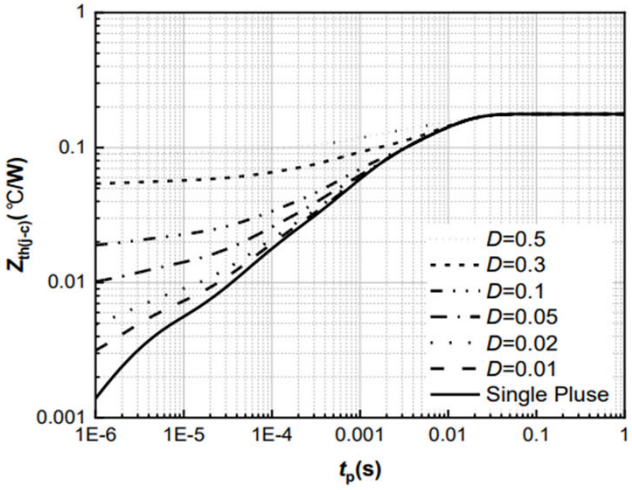


Figure 20. **Transient Thermal Impedance**

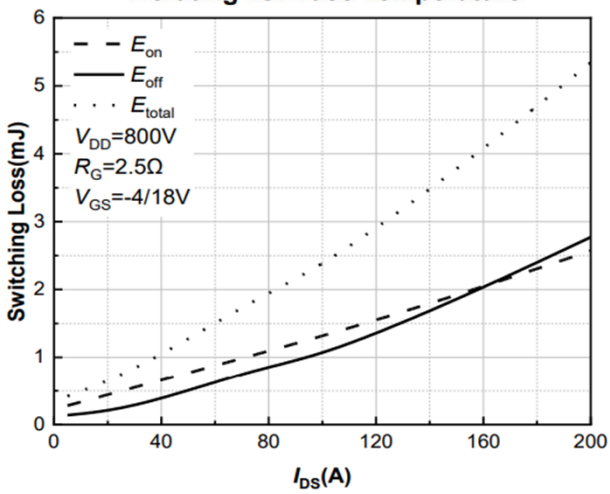


Figure 21. **Clamped Inductive Switching Energy vs. Drain Current**

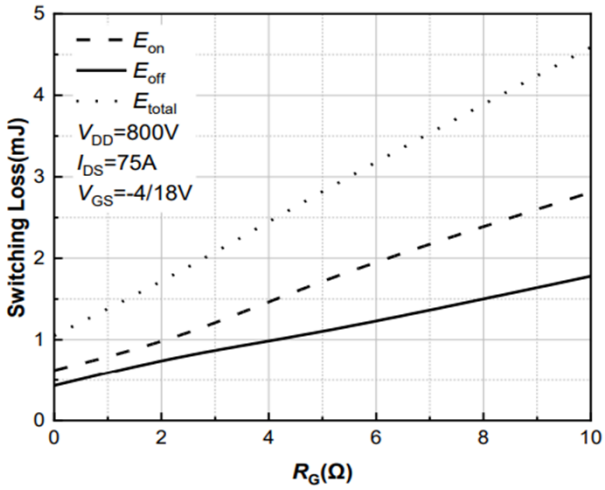


Figure 22. **Clamped Inductive Switching Energy vs. R_G**

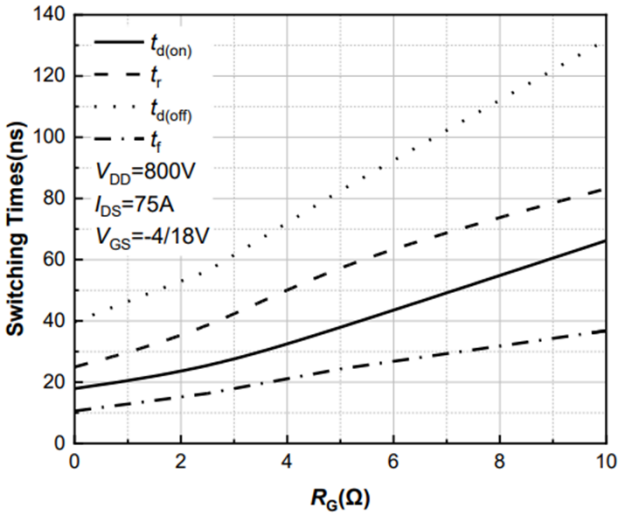


Figure 23. **Switching Times vs. R_G**

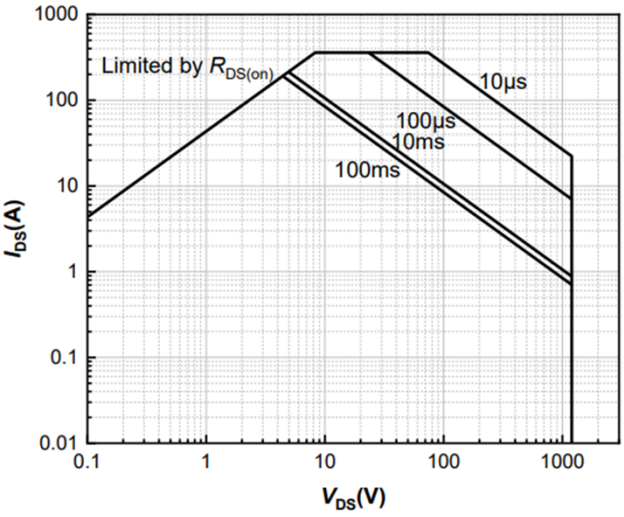
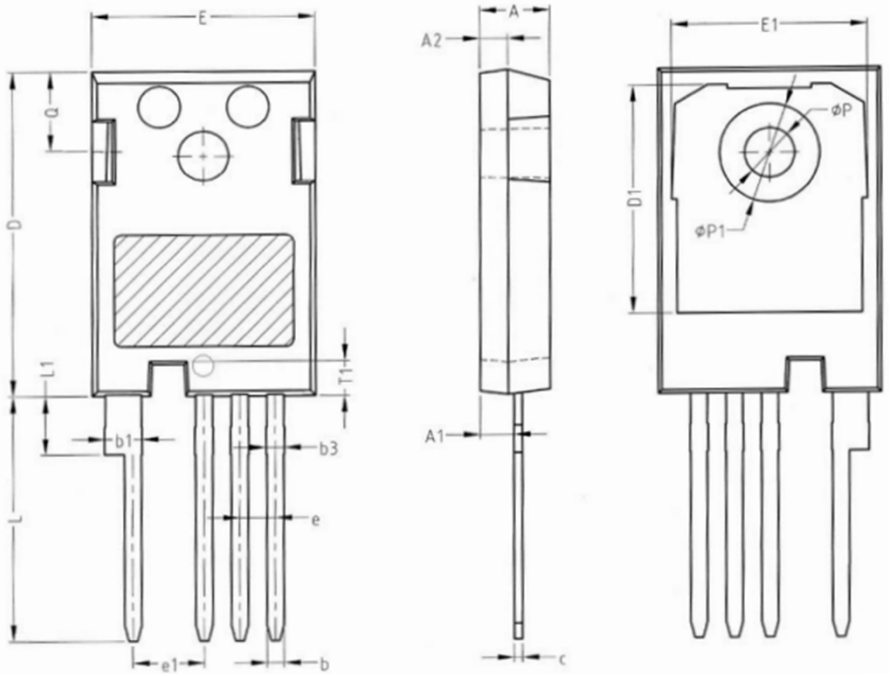


Figure 24. **Safe Operating Area**

Product dimension (TO-247-4L)



Dim	Millimeters		
	Min	Nom	Max
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.80	2.00	2.20
b	1.06	1.21	1.36
b1	2.33	2.63	2.93
b3	1.07	1.30	1.60
c	0.51	0.61	0.75
D	23.30	23.45	23.60
D1	16.25	16.55	16.85
E	15.74	15.94	16.14
E1	13.72	14.02	14.32
T1	2.35	2.50	2.65
e	2.54 BSC		
e1	5.08 BSC		
Q	5.49	5.79	6.09
L	17.27	17.57	17.87
L1	3.99	4.19	4.39
ΦP	3.40	3.60	3.80
ΦP1	7.19 REF		

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