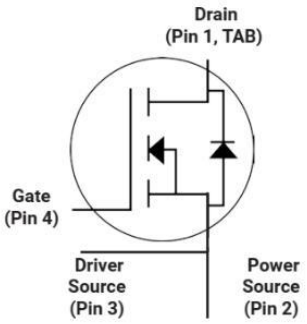
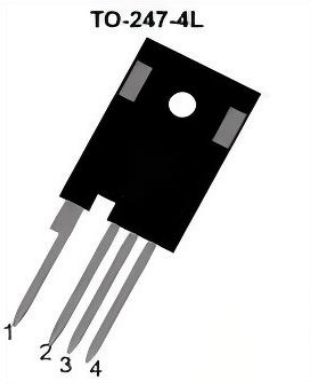
SiC MOSFET N-channel 165A/1200V

Parameter	Value	Unit
BV_{DSS}	1200	V
$R_{DS(ON),typ.(20V)}$	13	mΩ
$V_{GS(TH)}$	2.5 ~ 3.5	V
Eon	9	mJ
Eoff	2.1	mJ
I_D (at TC=25℃)	165	A





FEATURES

- High Speed Switching with Low Capacitance
- High Blocking Voltage with Low On-Resistance
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Reduced Cooling Requirements

APPLICATIONS

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

MAXIMUM RATED VALUES (at TJ = 25 °C, unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
V_{DSmax}	Drain-Source Voltage	1200	V	V_{GS} = 0 V, I_D = 1mA
V_{GSmax}	Gate-Source Voltage	-10/+25	V	Absolute maximum values
V_{GSop}	Gate-Source Voltage	-5/+18	V	Recommended operational values
I_D	Continuous Drain Current	165	A	V_{GS} = 18 V, Tc = 25˚C
		150		V_{GS} = 18 V, Tc = 60˚C
$I_{D(pulse)}$	Pulsed Drain Current	300	A	Pulse width t_P limited by T_{jmax}
P_D	Power Dissipation	288	W	T_C =25˚C, T_J = 175˚C
T_J , T_{stg}	Operating Junction and Storage Temperature	-40 to +175	˚C	
T_L	Solder Temperature	260	˚C	1.6mm (0.063”) from case for 10s

THERMAL CHARACTERISTICS

Symbol	Parameter	Min.	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case			0.27	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient			26.8	

ELECTRICAL CHARACTERISTICS (at TJ = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1200	-	-	V	V_{GS}= 0 V, I_D= 1mA
$V_{GS(th)}$	Gate threshold Voltage	2.5	3.0	3.5	V	V_{DS}= V_{GS}, I_D= 10mA
		-	2.5	-	V	V_{DS} = V_{GS}, I_D= 10mA, T_J=175°C
I_{DSS}	Zero Gate Voltage Drain Current	-	-	50	μA	V_{DS}= 1200 V, V_{GS}= 0 V
I_{GSS}	Gate Source Leakage Current	-	-	200	nA	V_{GS}=18 V, V_{DS} = 0 V
R_{DSON}	Drain-Source On-State Resistance	-	13	16	mΩ	V_{GS} = 18 V, I_D = 100 A
		-	24	-		V_{GS} = 18 V, I_D = 100A, T_J=175°C
g_{fs}	Transconductance	-	58	-	S	V_{GS}= 20 V, I_D= 100A
		-	55	-		V_{GS}= 20 V, I_D= 100A, T_J=175°C
C_{iss}	Input Capacitance	-	7500	-	pF	V_{DS}=800V,V_{GS}=0V, T_J=25°C,f= 100kHz
C_{oss}	Output Capacitance	-	284	-		
C_{rss}	Reverse Capacitance	-	18	-		
E_{oss}	C_{oss} Stored Energy	-	161	-	μJ	
E_{on}	Turn on Switching Energy	-	9000	-	μJ	V_{DS} = 800 V, V_{GS} = -5/+15 V, I_D=150A, $R_{g(ext)}$=5Ω,T_J= 125°C
E_{off}	Turn off Switching Energy	-	2100	-		
t_{don}	Turn on delay time	-	31	-	ns	V_{DS} = 800 V, V_{GS} = -5/+15 V, I_D = 150A, $R_{g(ext)}$= 5Ω,T_J= 125°C
t_r	Rise time	-	47	-		
t_{doff}	Turn off delay time	-	83	-		
t_f	Fall time	-	76	-		
R_{gint}	Internal Gate Resistance	-	2.5	-	Ω	V_{AC}=25mV, f= 1MHz
Q_{gs}	Gate to Source Charge	-	70	-	nC	V_{DS}= 800 V, V_{GS}= -5/+18 V, I_D = 150A
Q_{gd}	Gate to Drain Charge	-	92	-		
Q_g	Total Gate Charge	-	260	-		

SOURCE-DRAIN BODY DIODE CHARACTERISTICS

Symbol	Parameter	Min	Typ.	Max.	Unit	Test Conditions
I_{SD}	Continuous Source Current			132	A	V_{GS}= -5 V, Tc=25°C
V_{SD}	Diode Forward Voltage		4.9		V	V_{GS}= -5 V, I_{SD}= 100 A
			4.5			V_{GS}= -5 V, I_{SD}= 100 A,T_J= 175°C
t_{rr}	Reverse Recovery Time		67		ns	V_R= 800 V, V_{GS} = -5V/+15V, I_D = 150A, di/dt=2500A/μS, T_J= 125°C,R_G=5 Ω
Q_{rr}	Reverse Recovery Charge		1600		nC	
I_{rrm}	Peak Reverse Recovery Current		36		A	

TYPICAL CHARACTERISTICS CURVES

Figure 1. Output Characteristics TJ = -40 ºC

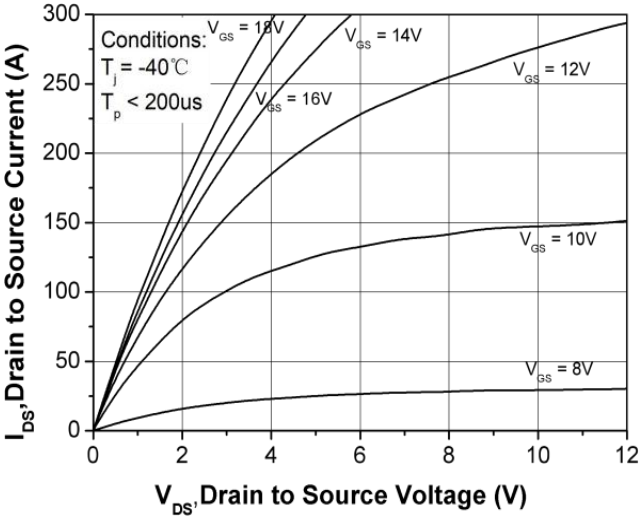


Figure 2. Output Characteristics TJ = 25 ºC

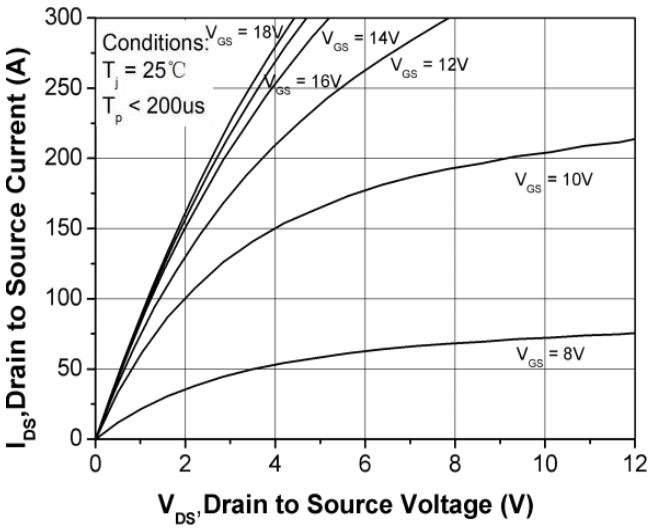


Figure 3. Output Characteristics TJ = 175ºC

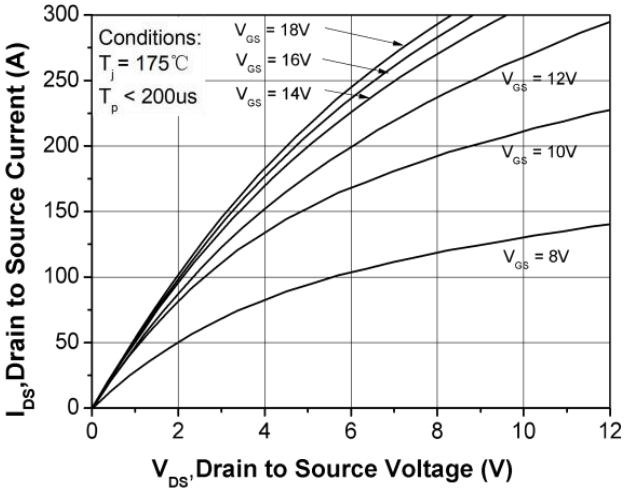


Figure 4. Normalized On-Resistance vs. Temperature

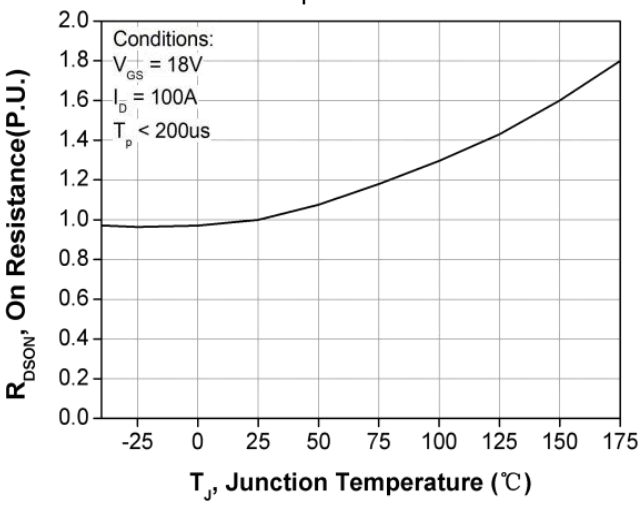


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

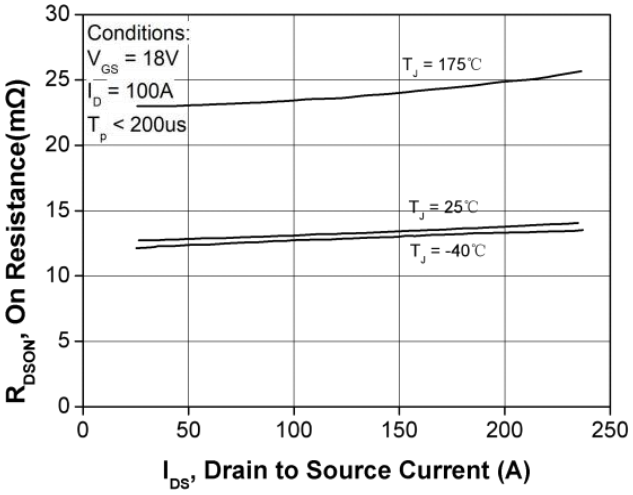


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

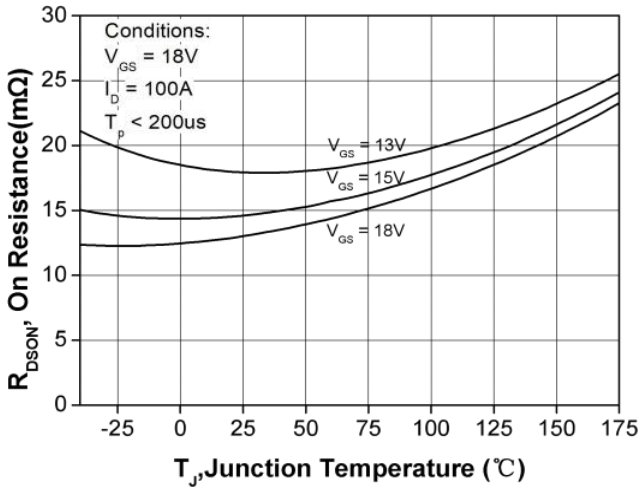


Figure 7. Transfer Characteristic for Various Junction Temperatures

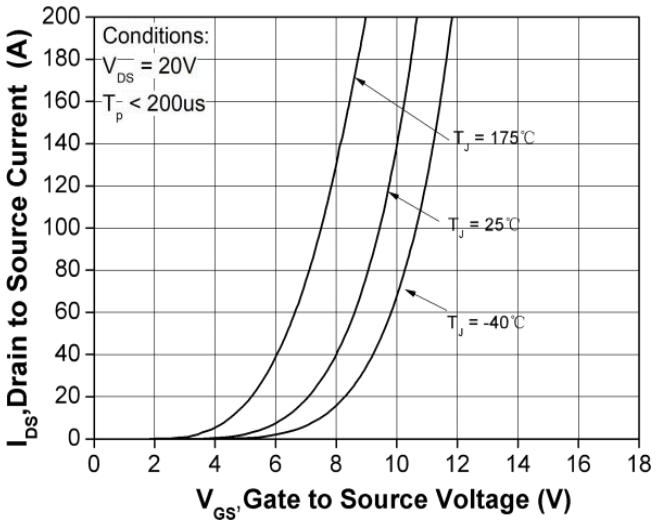


Figure 8. Body Diode Characteristic at TJ = -40°C

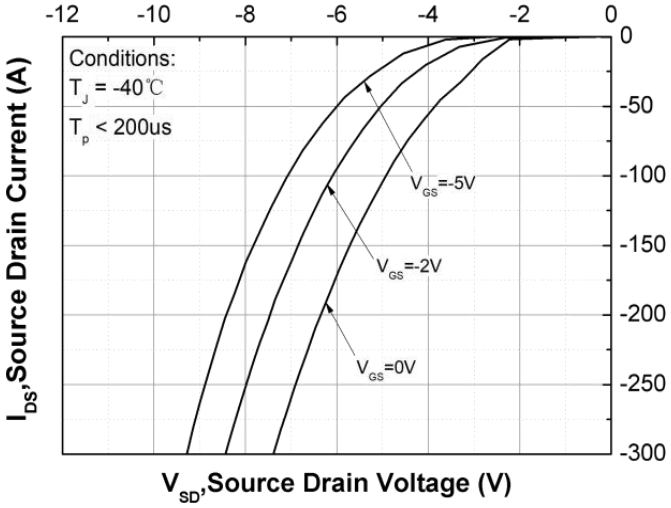


Figure 9. Body Diode Characteristic at TJ = 25 °C

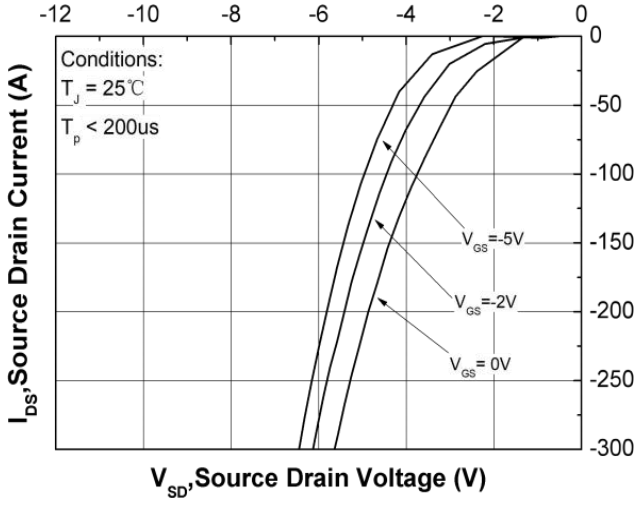


Figure 10. Body Diode Characteristic at TJ = 175 °C

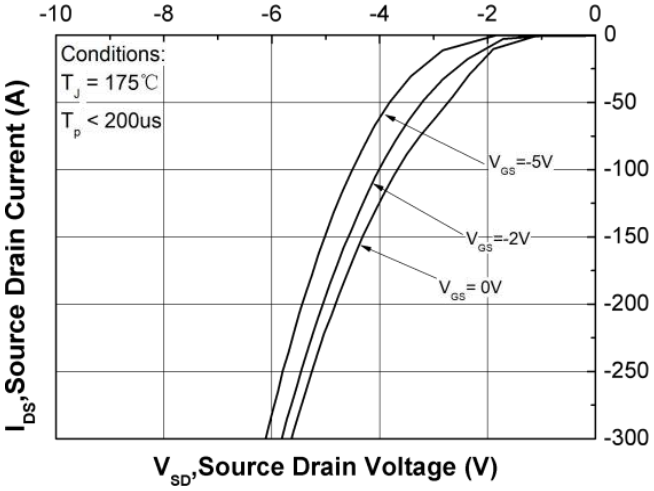


Figure 11. Threshold Voltage vs. Temperature

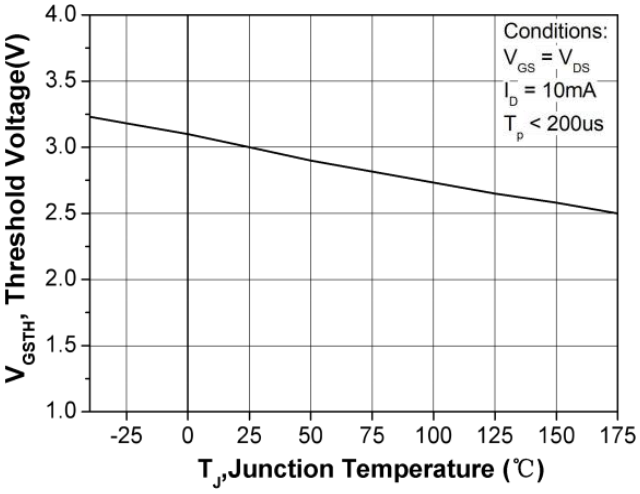


Figure 12. Gate Charge Characteristic

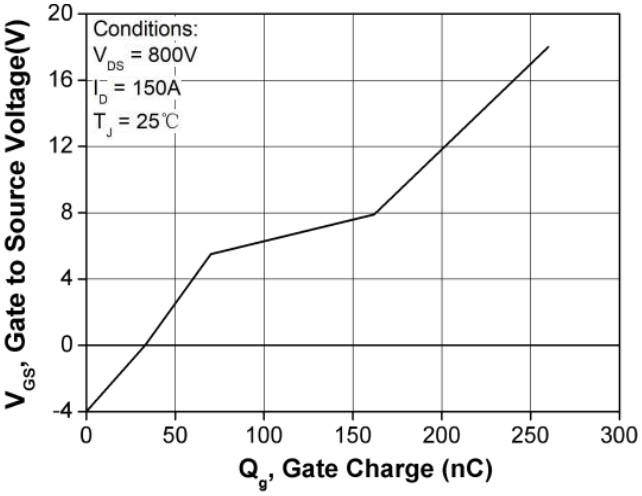


Figure 13. 3rd Quadrant Characteristic at TJ = -40 ºC

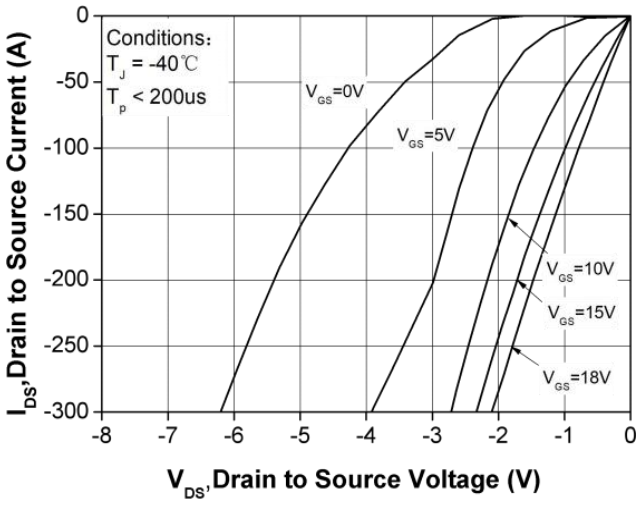


Figure 14. 3rd Quadrant Characteristic at TJ = 25 ºC

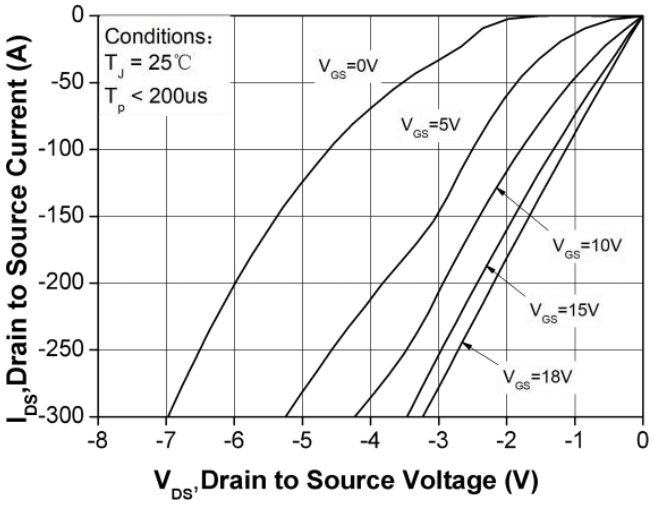


Figure 15. 3rd Quadrant Characteristic at TJ = 175ºC

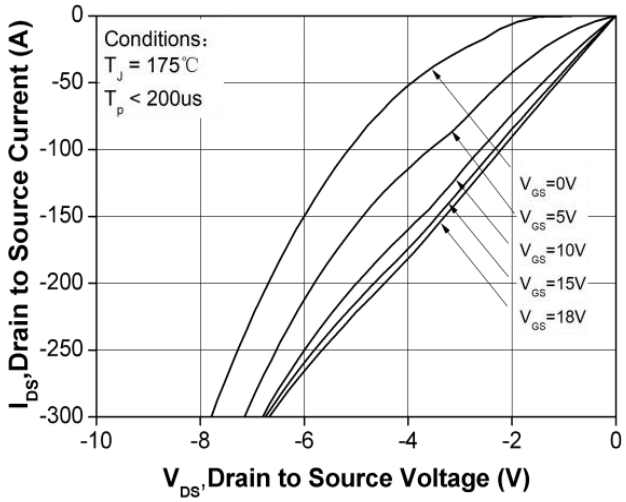


Figure 16. Output Capacitor Stored Energy

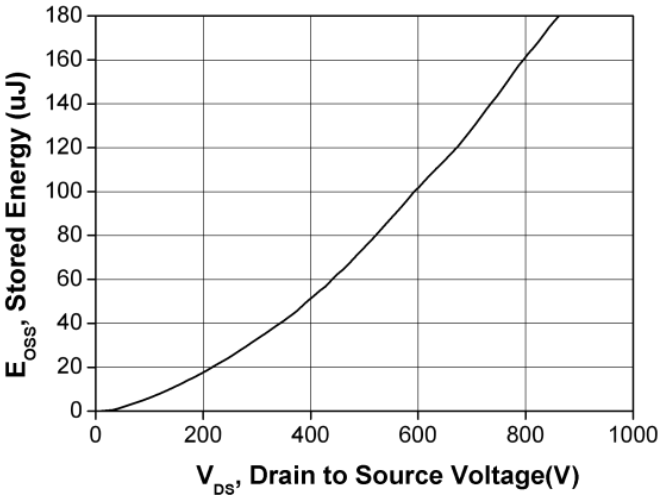


Figure 17. Capacitance vs. Drain-Source Voltage (0 - 200V)

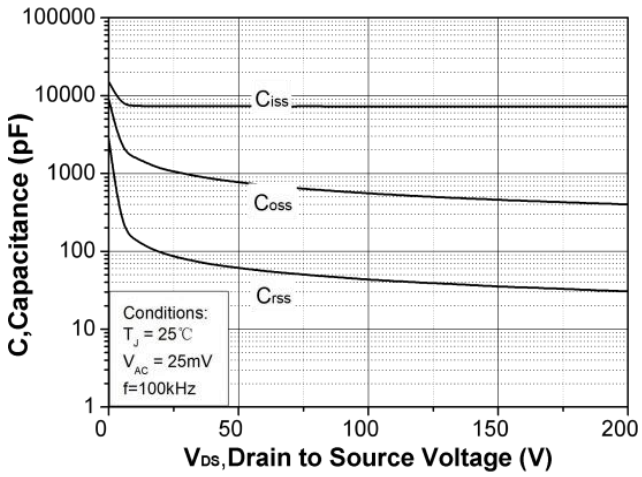


Figure 18. Capacitance vs. Drain-Source Voltage (0 - 800V)

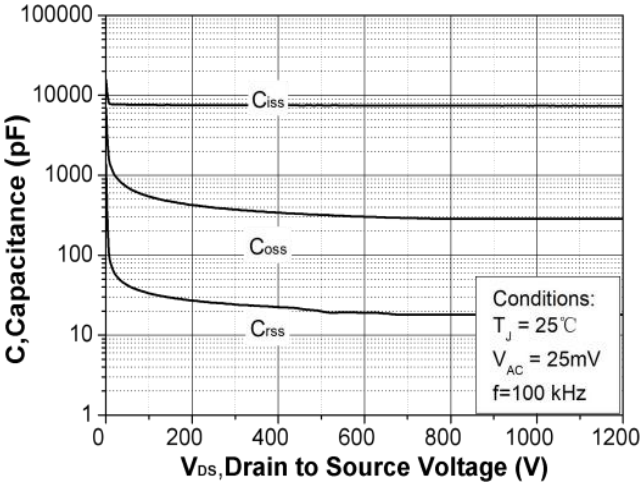


Figure 19. Continuous Drain Current Derating vs. Case Temperature

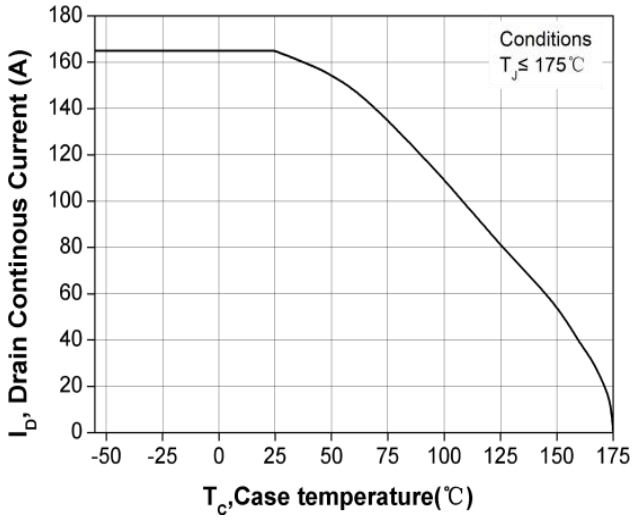


Figure 20. Maximum Power Dissipation Derating vs.Case Temperature

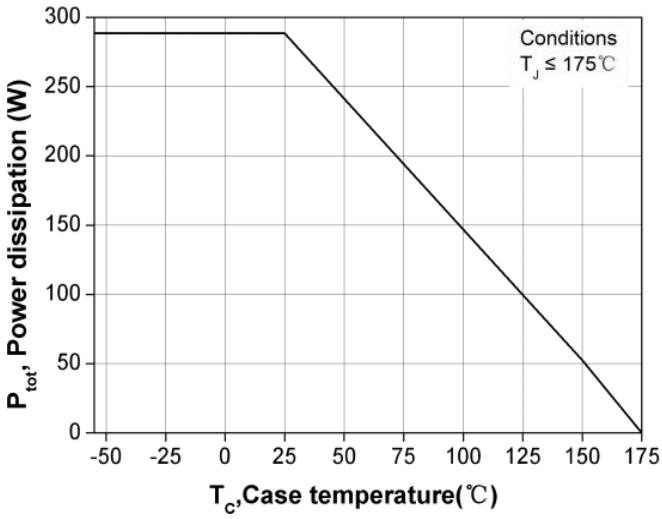


Figure 21. Transient Thermal Impedance (Junction - Case)

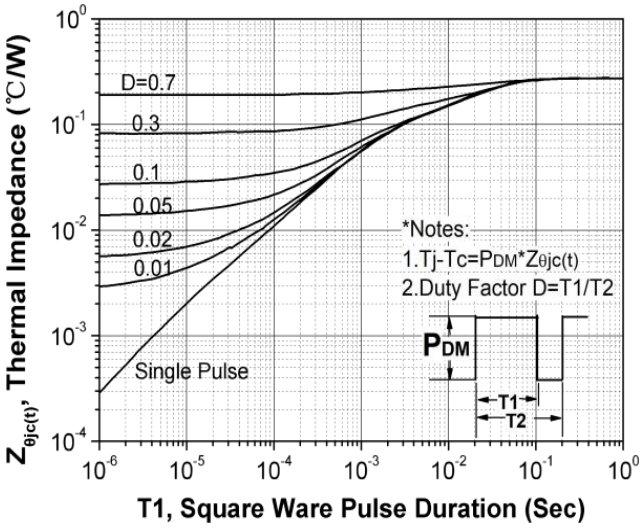


Figure 22. Safe Operating Area

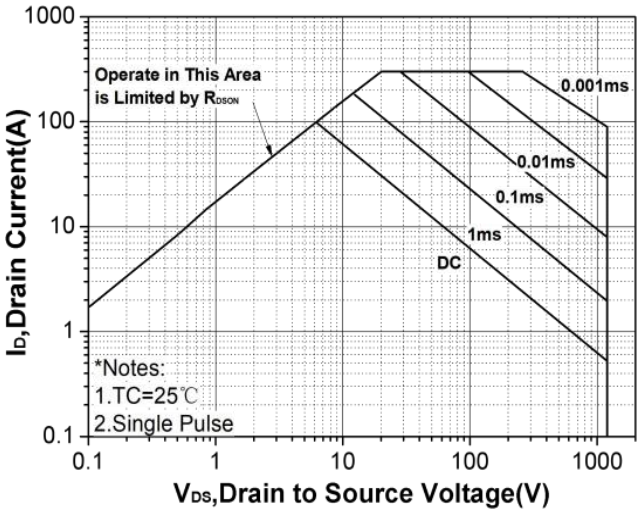


Figure 23. Clamped Inductive Switching Energy vs. Low Drain Current (VDD= 800V)

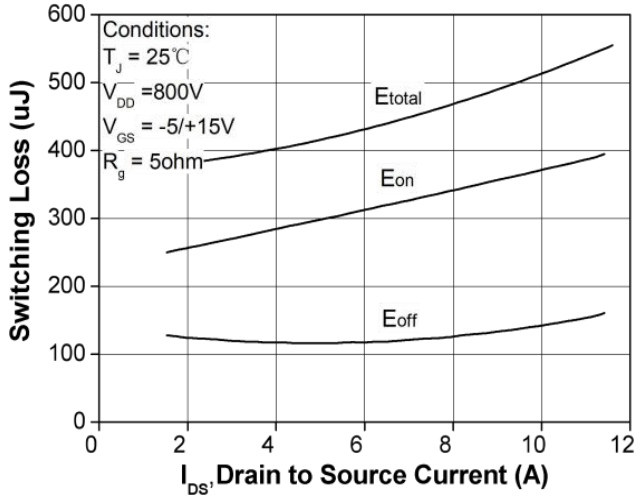


Figure 24. Clamped Inductive Switching Energy vs. High Drain Current (VDD= 800V)

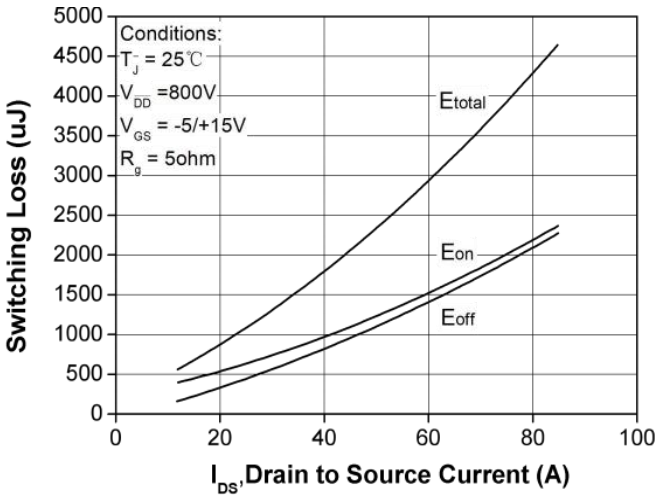


Figure 25. Clamped Inductive Switching Energy vs. RG(ext)

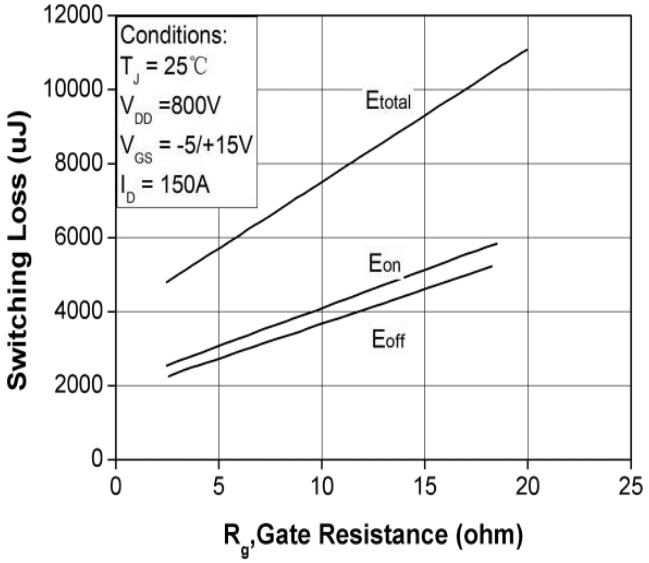


Figure 26. Clamped Inductive Switching Energy vs. Temperature

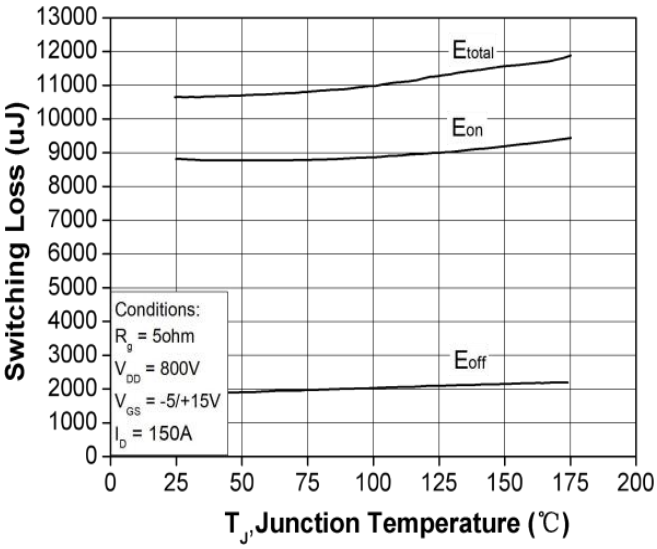


Figure 27. Switching Times vs. RG(ext)

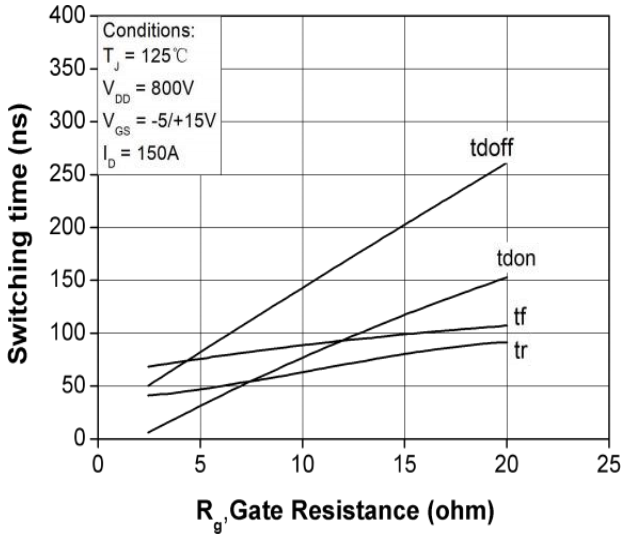
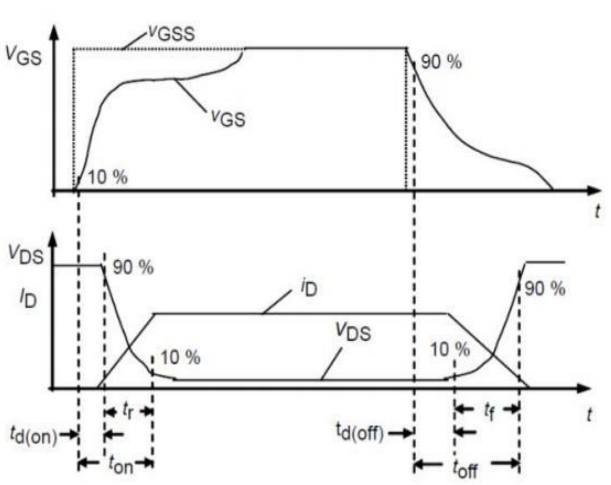
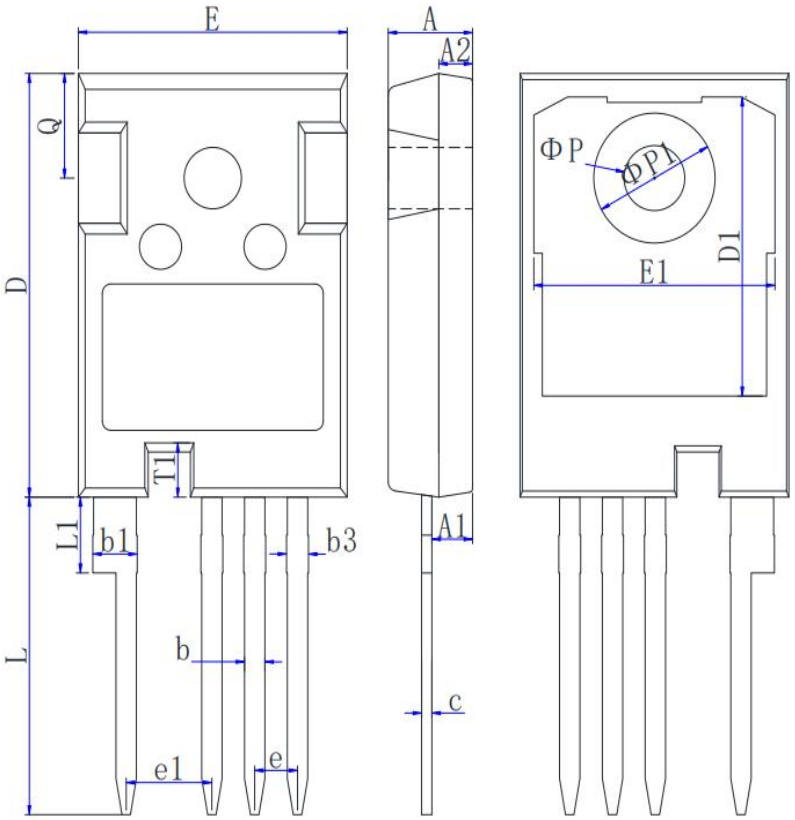


Figure 28. Switching Times Definition



PACKAGE OUTLINES

TO-247-4L



SYMBOL	MM		
	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	2.54BSC		
e1	5.08BSC		
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	7.19REF		

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