TECHNICAL DATA
DATA SHEET D0240 REV. B

SILICON CARBIDE 1200V 104A POWER MOSFET DIE

Applications:

- **Solar inverters • Switch Mode Power Supplies • High voltage DC/DC converters**
- **Battery charges • Mode drive • Pulsed power application**

Features:

- **High blocking voltage with low on-resistance**
- **High Speed Switching with low capacitances**
- **Easy to parallel and simple to drive**
- **Avalanche ruggedness**
- **Resistant to latch-up**
- **Silver back metal**

Maximum Ratings@T_A=25°C unless otherwise specified:

Characteristics	Symbol	Condition	Max.	Units
Drain - Source Voltage	V_{DSmax}	V_{GS} = 0 V, I_D = 100 µA	1200	V
Gate - Source Voltage (dynamic)	V_{GSmax}	AC (f >1 Hz)	-10/+25	V
Gate - Source Voltage (static)	V_{GSop}	Static	-5/+20	V
Continuous Drain Current	I_D	V_{GS} =20 V, T_C = 25˚C	104	A
Pulsed Drain Current	$I_{D(pulse)}$	Pulse width t_P limited by T_{jmax}	300	A
Operating Junction and Storage	T_J , T_{stg}		-55 to +175	˚C
Maximum Processing Temperature	T_{Proc}	10 min. maximum	325	˚C

(1) When using MOSFET body diode V_{GSmax} = -5V/+25V

(2) MOSFET can also safely operate at V_{GS} = 0/+20 V

(3) Assumes a $R_{\theta JC}$ < 0.35 K/W

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Electrical Characteristics@T_A=25°C unless otherwise specified:

Characteristics	Symbol	Condition	Min.	Typ.	Max.	Units
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 100 µA	1200			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 15mA	1.8	2.3	4	V
		V_{DS} = V_{GS}, I_D = 15mA, T_J = 175 °C		1.4		
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 1200 V, V_{GS} = 0 V		2	100	uA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = 20 V, V_{DS} = 0 V			250	nA
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = 20 V, I_D = 50 A		25	34	mΩ
		V_{GS} = 20 V, I_D = 50 A, T_J = 175 °C		32		
Transconductance	g_{fs}	V_{DS}= 20 V, I_{DS}= 50 A		21		S
		V_{DS}= 20 V, I_{DS}= 50 A, T_J = 175 °C		23		
Input Capacitance	C_{iss}	V_{GS} = 0 V V_{DS} =1000V f = 1 MHz VAC = 25 mV		4054		pF
Output Capacitance	C_{oss}			246		
Reverse Transfer Capacitance	C_{rss}			17		
C_{oss} Stored Energy	E_{oss}			129		µJ
Internal Gate Resistance	$R_{G(int)}$	f = 1 MHz, V_{AC} = 25 mV, ESR of C_{ISS}		2.2		Ω
Gate to Source Charge	Q_{gs}	V_{DS} = 800 V, V_{GS} = -5/20 V I_D = 50 A Per IEC60747-8-4 pg 83		33		nC
Gate to Drain Charge	Q_{gd}			67		
Total Gate Charge	Q_g			165		

Reverse Diode Characteristics:

Characteristics	Symbol	Condition	Typ.	Max.	Units
Diode Forward Voltage	V_{SD}	V_{GS} = - 5 V, I_{SD} = 25 A	3.5		V
		V_{GS} = - 5 V, I_{SD} = 25 A, T_J = 175 °C	3.1		V
Continuous Diode Forward Current	I_S	T_C= 25 °C		130	
Reverse Recovery Time	t_{rr}	V_{GS} = - 5 V, I_{SD} = 50 A ,T_J = 25 °C VR = 800 V, dif/dt = 1790 A/µs	33		ns
Reverse Recovery Charge	Q_{rr}		384		nC
Peak Reverse Recovery Current	I_{rrm}		22		A

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Typical Performance:

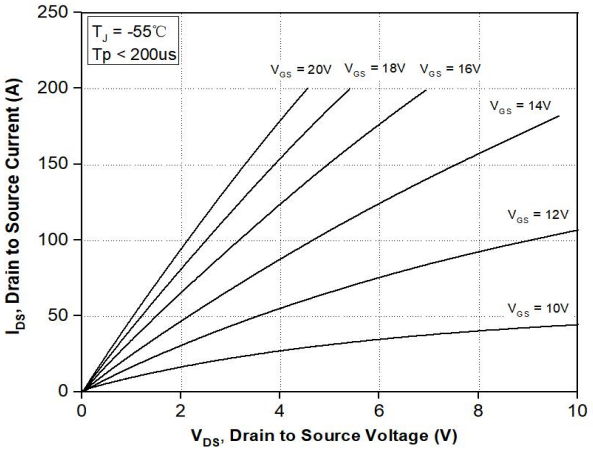

Figure 1. Output Characteristics T_J = -55 °C

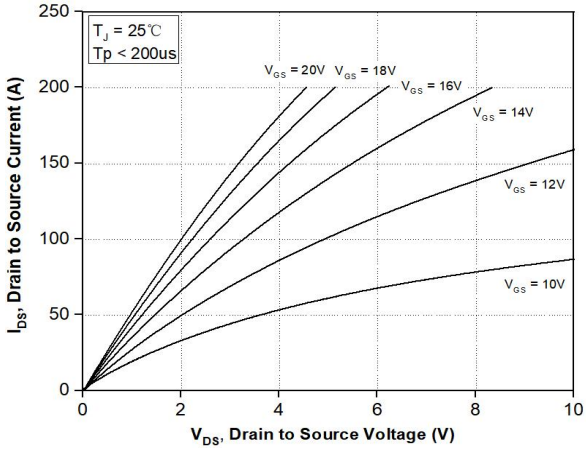

Figure 2. Output Characteristics T_J = 25 °C

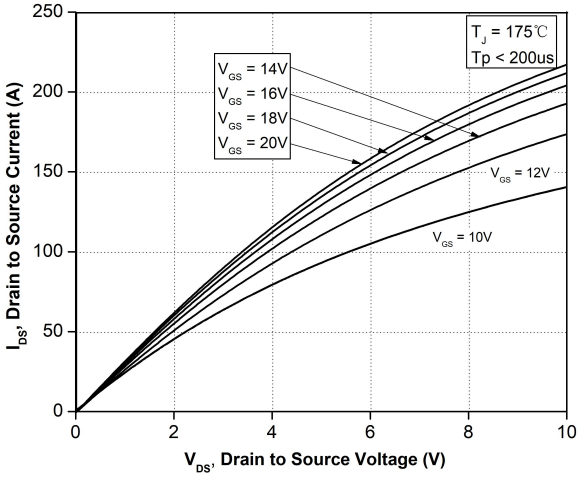

Figure 3. Output Characteristics T_J = 175°C

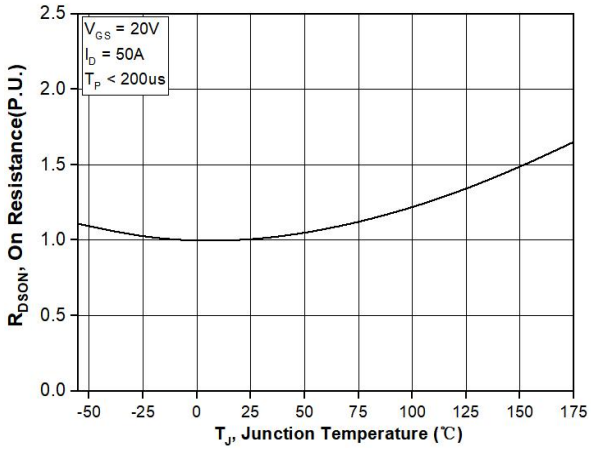

Figure 4. Normalized On-Resistance vs. Temperature

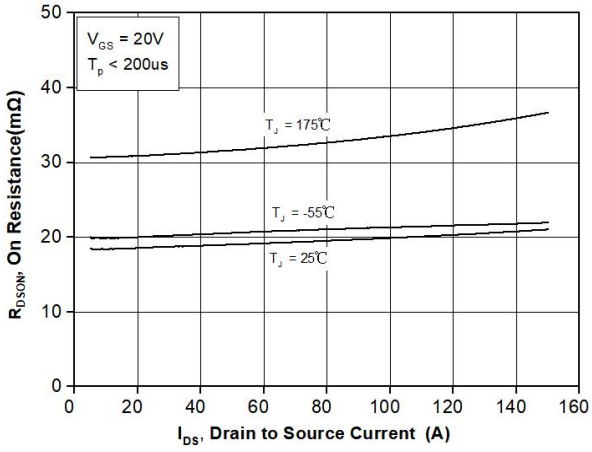

Figure 5. On-Resistance vs. Drain Current For Various Temperatures

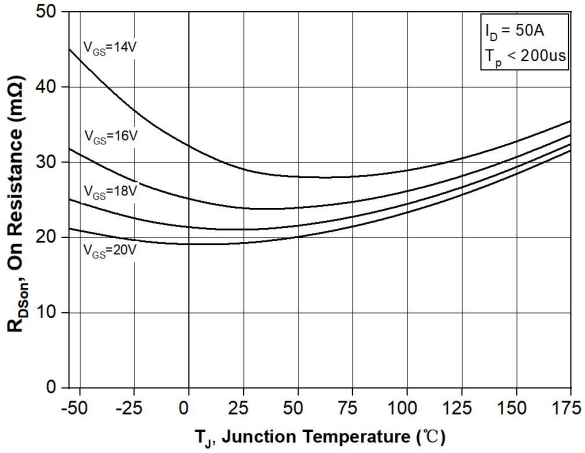

Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

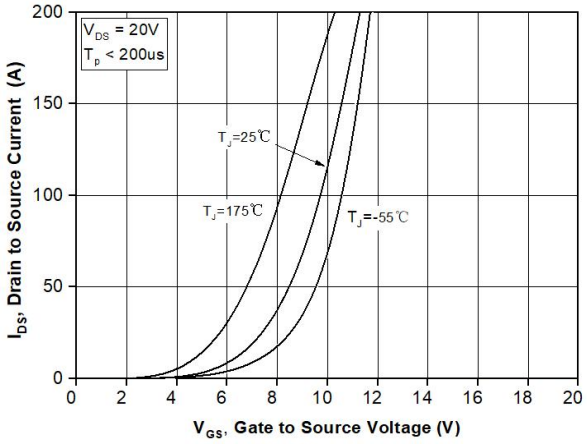

Figure 7. Transfer Characteristic for Various Junction Temperatures

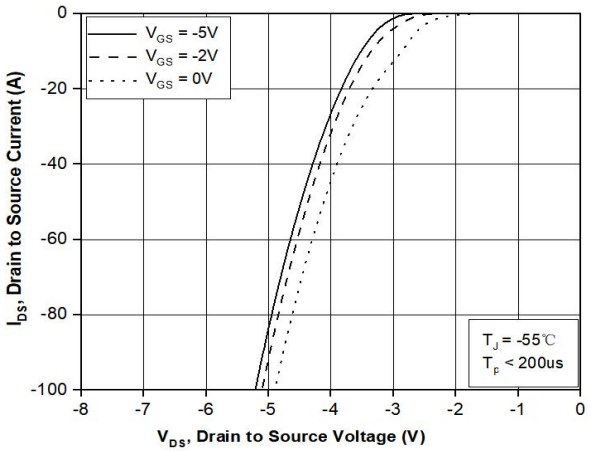

Figure 8. Body Diode Characteristic at T_J = -55 °C

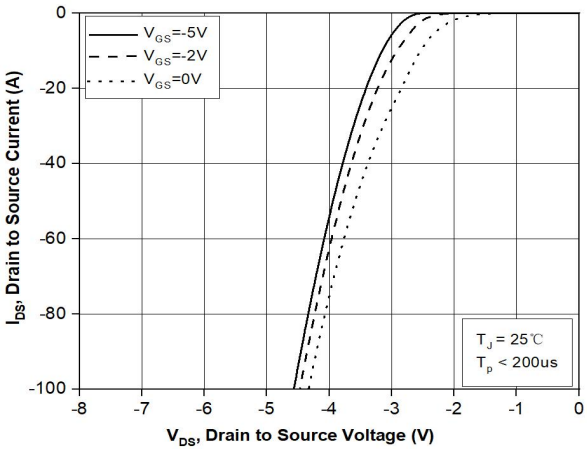

Figure 9. Body Diode Characteristic at T_J = 25 °C

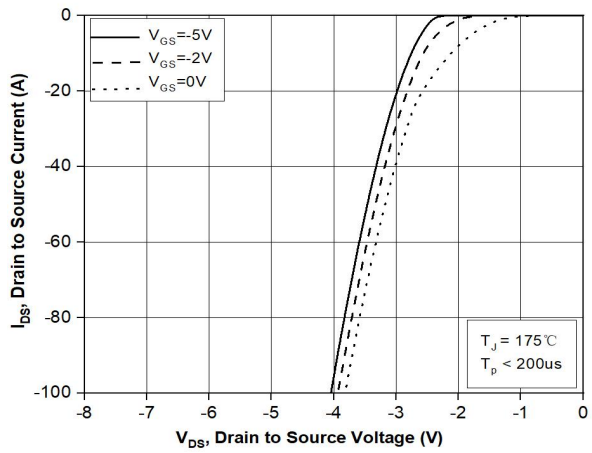

Figure 10. Body Diode Characteristic at T_J = 175 °C

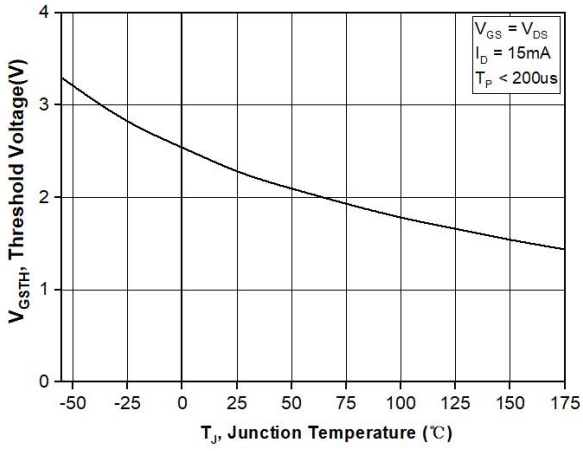

Figure 11. Threshold Voltage vs. Temperature

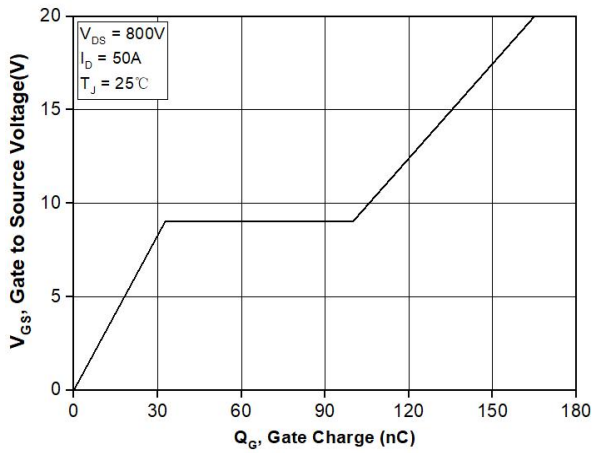

Figure 12. Gate Charge Characteristic

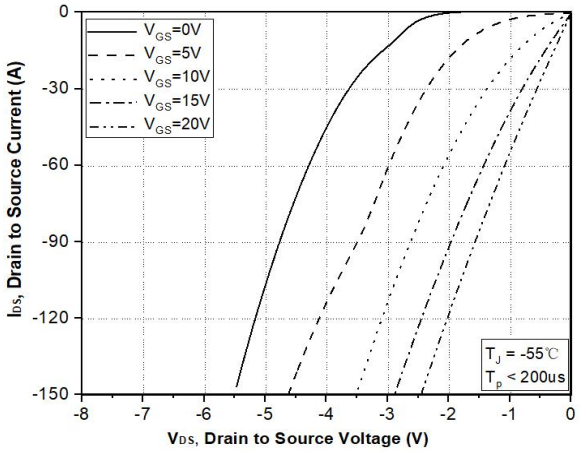

Figure 13. 3rd Quadrant Characteristic at T_J = -55 °C

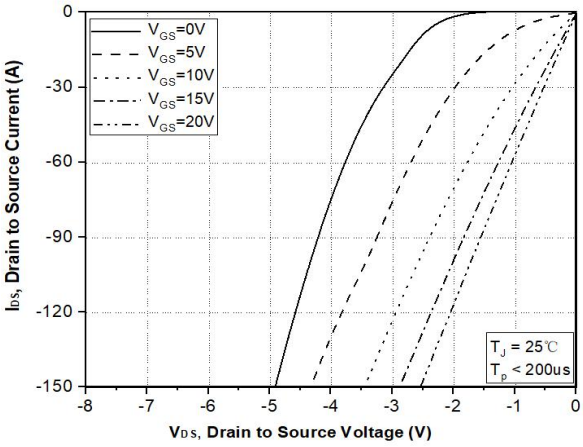

Figure 14. 3rd Quadrant Characteristic at T_J = 25 °C

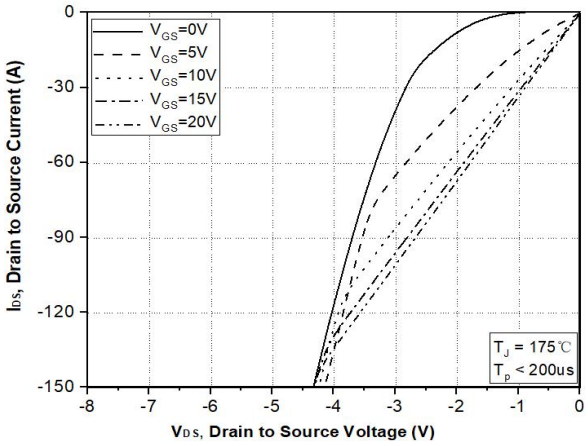

Figure 15. 3rd Quadrant Characteristic at T_J = 175°C

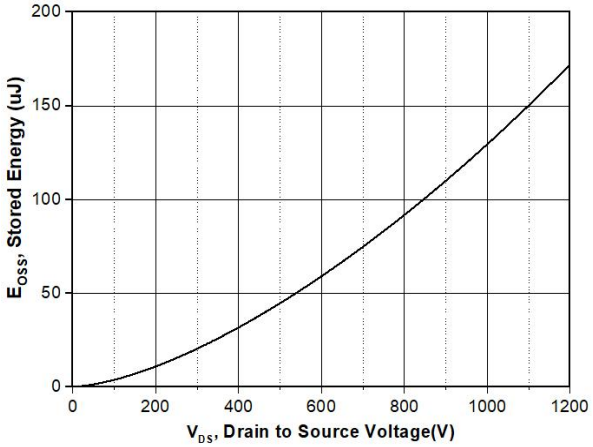

Figure 16. Output Capacitor Stored Energy

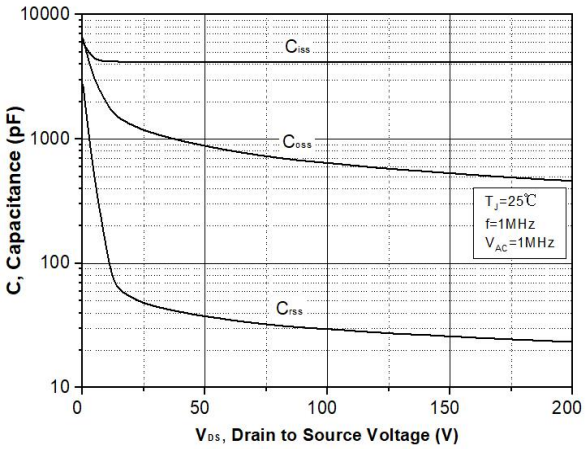

Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

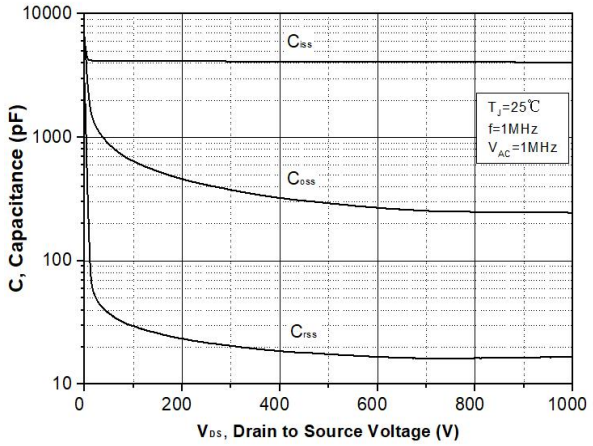

Figure 18. Capacitances vs. Drain-Source Voltage (0 - 1000V)

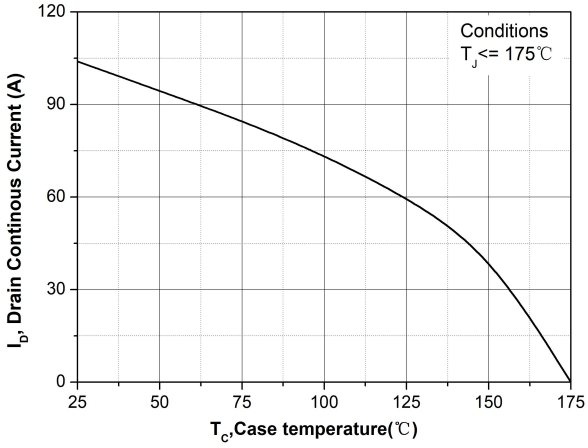

Figure 19. Continuous Drain Current Derating vs. Case Temperature

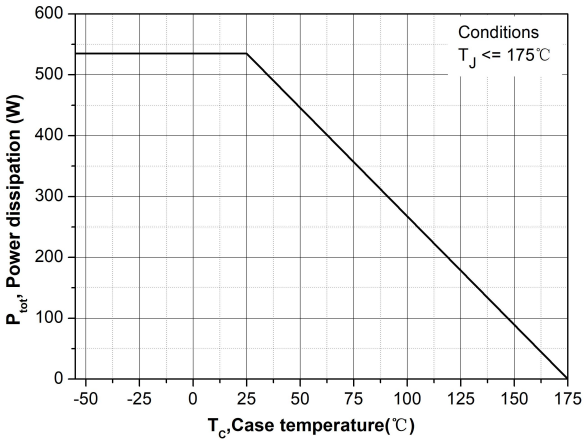

Figure 20. Maximum Power Dissipation Derating vs. Case Temperature

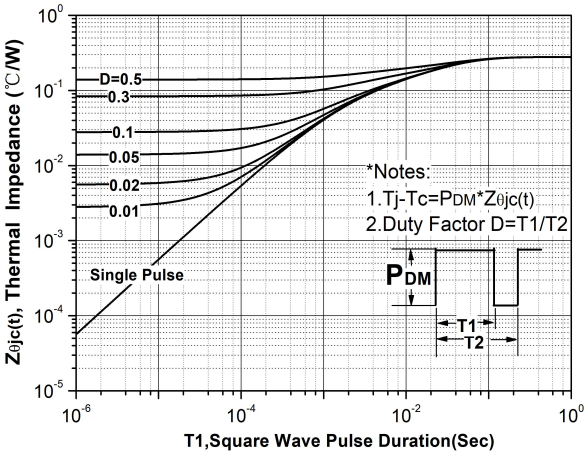

Figure 21. Transient Thermal Impedance (Junction - Case)

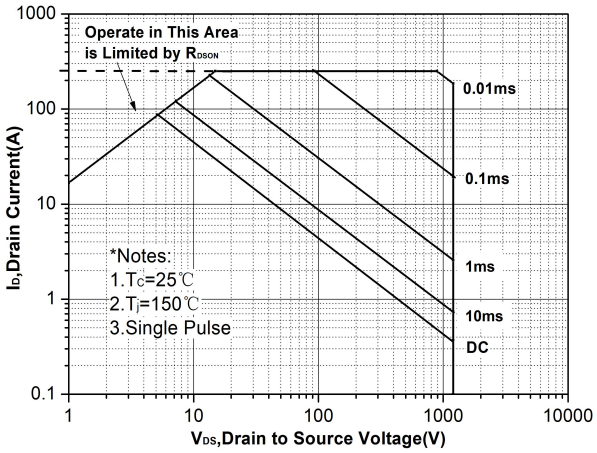

Figure 22. Safe Operating Area

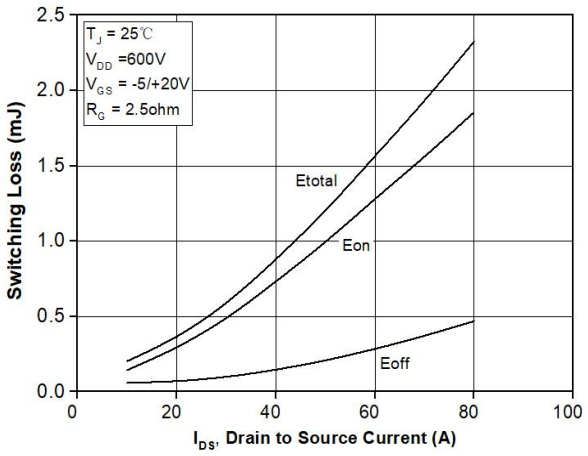

Figure 23. Clamped Inductive Switching Energy vs. Drain Current (V_{DD} = 600V)

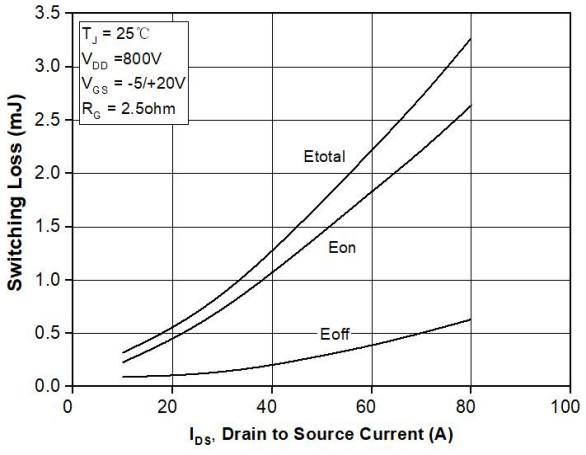

Figure 24. Clamped Inductive Switching Energy vs. Drain Current (V_{DD} = 800V)

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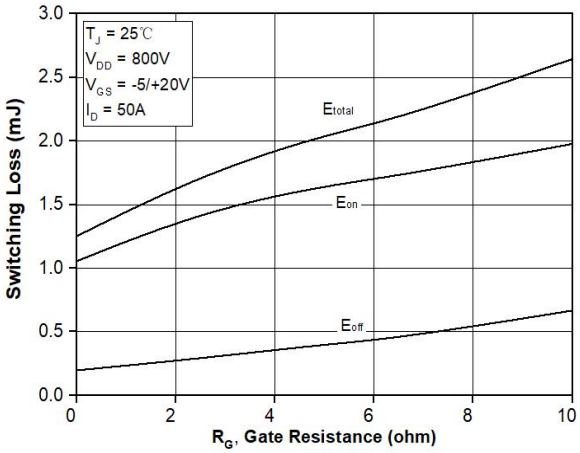

Figure 25. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

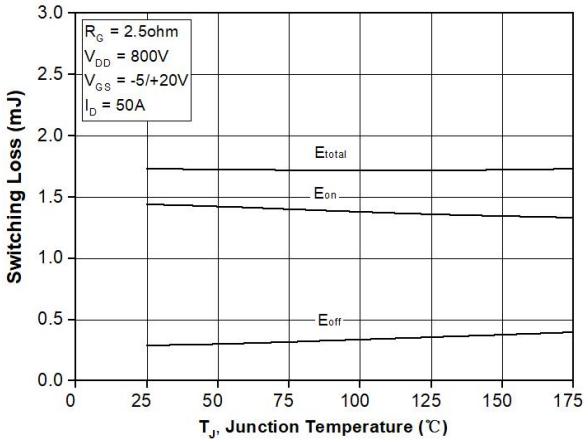

Figure 26. Clamped Inductive Switching Energy vs. Temperature

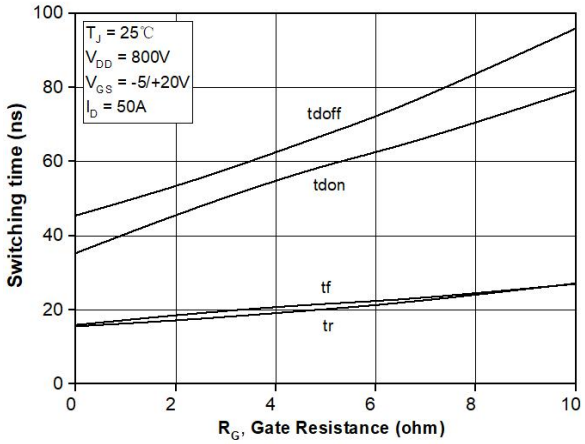

Figure 27. Switching Times vs. $R_{G(ext)}$

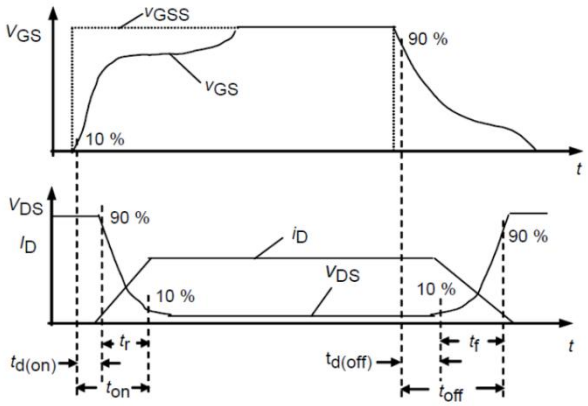

Figure 28. Switching Times Definition

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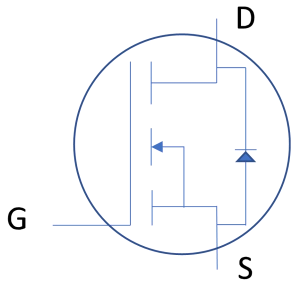
Mechanical Dimensions



Parameter	Typical Value	Unit
Die Dimensions (L x W)	Please contact your sales representative to get the detailed information about die layout and dimensions.	mm
Exposed Source Pad Metal Dimensions (LxW) Each		mm
Sense Pad Metal Dimensions (LxW)		mm
Gate Pad Dimensions (L x W)		mm
Top Side Source metallization (Al)		µm
Top Side Gate metallization (Al)		µm
Bottom Drain metallization (Ni/Ag)		µm