

1700V N-Channel Silicon Carbide Power MOSFET

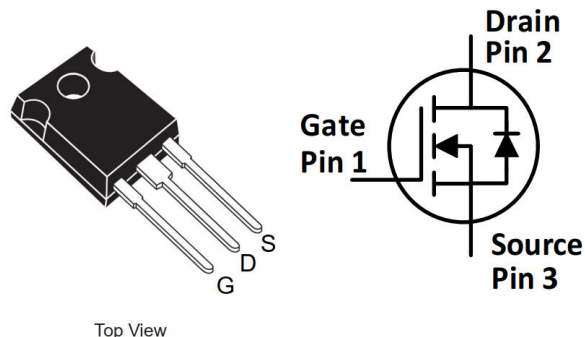
Package:

Features:

- Low on-resistance
- Fast switching speed with low capacitances
- Fast intrinsic diode with low reverse recovery (Q_{RR})
- Halogen-free, RoHS compliant

Applications:

- Motor drives
- DC/DC converters
- Switched mode power supplies
- Solar inverters



Part Number	Package
DTN055N170SC3	TO247-3

Absolute Maximum Ratings ($T_c=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
V_{DS}	Drain-Source voltage	1700	V	$V_{GS}=0\text{V}$, $I_D=100\mu\text{A}$
V_{GS}	Gate-Source voltage	-10 to 22	V	Recommended maximum
I_D	Drain current (continuous)	5.5	A	$T_c=25^\circ\text{C}$
		4	A	$T_c=100^\circ\text{C}$
I_{DM}	Drain current (pulsed)	11	A	Pulse width limited by SOA
P_{TOT}	Total power dissipation	100	W	$T_c=25^\circ\text{C}$
T_{stg}	Storage temperature range	-55 to 175	$^\circ\text{C}$	
T_J	Operating junction temperature	-55 to 175	$^\circ\text{C}$	
T_L	Solder Temperature	260	$^\circ\text{C}$	

Thermal Data

Symbol	Parameter	Value	Unit
$R_{\theta(j-c)}$	Thermal Resistance from Junction to Case	1.5	$^\circ\text{C/W}$

Electrical Characteristics ($T_c=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
I _{DSS}	Zero gate voltage drain current		5	50	μA	V _{DS} =1700V, V _{GS} =0V
I _{GSS}	Gate leakage current		1	±100	nA	V _{DS} =0V, V _{GS} = -10~22V
V _{TH}	Gate threshold voltage		3.2		V	V _{GS} =V _{DS} , I _D =0.7mA
			2			V _{GS} =V _{DS} , I _D =0.7mA @ T _C =175°C
R _{ON}	Static drain-source on-resistance		1000	1500	mΩ	V _{GS} =18V, I _D =2A @T _J =25°C
			2100		mΩ	V _{GS} =18V, I _D =2A @T _J =175°C
C _{iss}	Input capacitance		184		pF	V _{DS} =1000V, V _{GS} =0V, f=100kHz, V _{AC} =25mV
C _{oss}	Output capacitance		12		pF	
C _{rss}	Reverse transfer capacitance		3		pF	
E _{oss}	C _{oss} stored energy		7		μJ	
Q _g	Total gate charge		16.5		nC	V _{DS} =1200V, I _D =1A, V _{GS} = -6 to 18V
Q _{gs}	Gate-source charge		2.5		nC	
Q _{gd}	Gate-drain charge		12		nC	
R _g	Gate input resistance		8.7		Ω	f=1MHz
E _{ON}	Turn-on switching energy		45		μJ	V _{DS} =1200V, I _D =2A, V _{GS} = -6 to 18V, R _{G(ext)} =2.5Ω, L=1000μH
E _{OFF}	Turn-off switching energy		21		μJ	
t _{d(on)}	Turn-on delay time		5		ns	
t _r	Rise time		8			
t _{d(off)}	Turn-off delay time		6			
t _f	Fall time		41			

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

Symbol	Parameter	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
V_{SD}	Diode forward voltage		3.8		V	$I_{SD}=1\text{A}$, $V_{GS}=-4\text{V}$
			3.5		V	$I_{SD}=1\text{A}$, $V_{GS}=-4\text{V}$, $T_J=175^{\circ}\text{C}$
t_{rr}	Reverse recovery time		15		ns	$V_{GS}=-4\text{V}$
Q_{rr}	Reverse recovery charge		68		nC	$I_{SD}=2\text{A}$, $V_R=1200\text{V}$, $di/dt=2350\text{A}/\mu\text{s}$,
I_{RRM}	Peak reverse recovery current		5		A	$T_J=175^{\circ}\text{C}$

Typical Performance (curves)

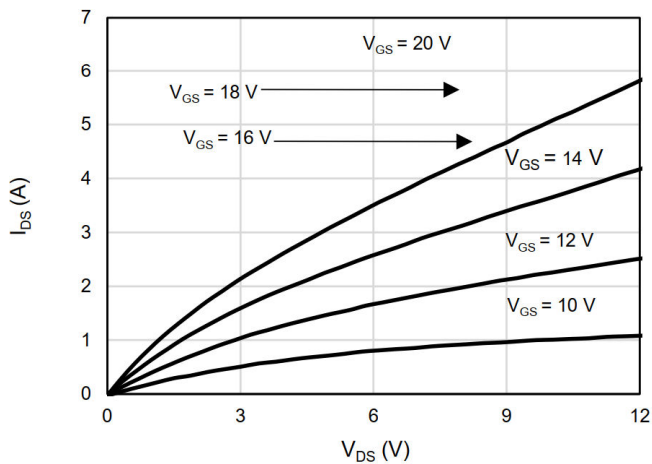


Figure 1: Output Characteristics $T_J = -40^\circ\text{C}$

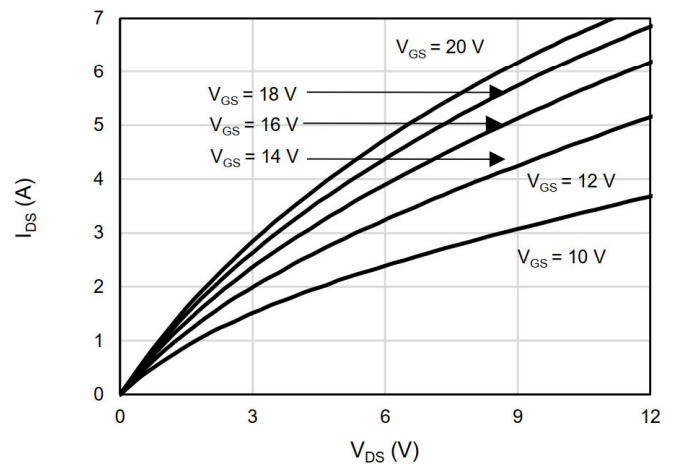


Figure 2: Output Characteristics $T_J = 25^\circ\text{C}$

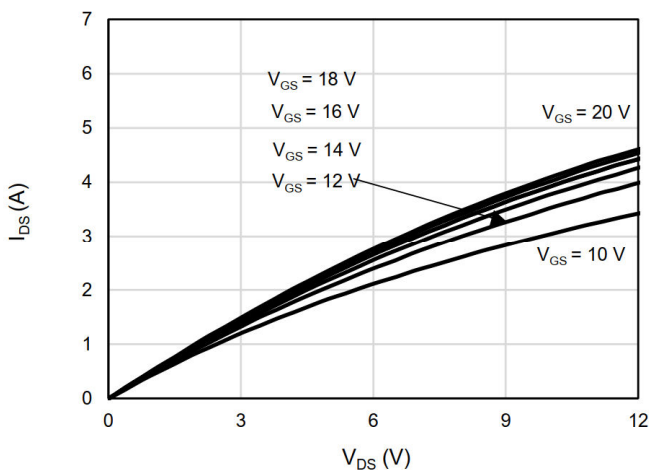


Figure 3: Output Characteristics $T_J = 175^\circ\text{C}$

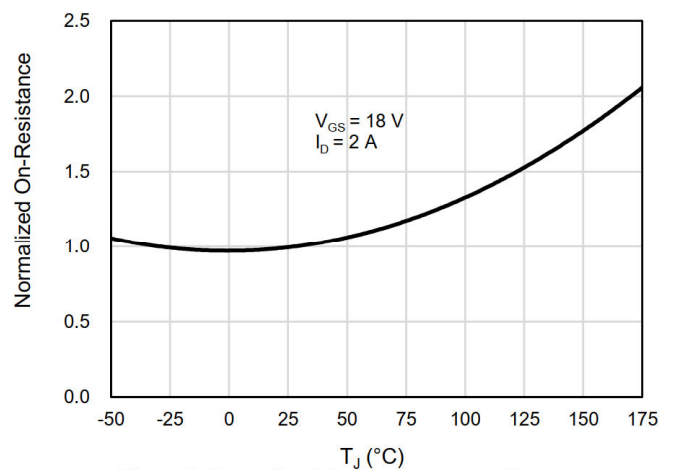


Figure 4: Normalized On-Resistance vs. Temperature

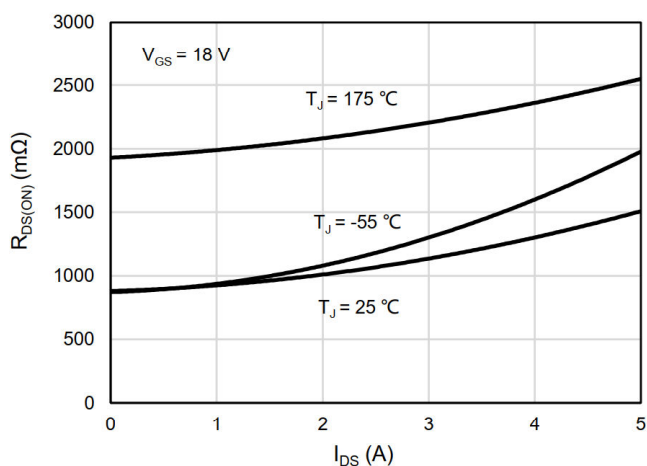


Figure 5: On-Resistance vs. Drain Current For Various Temperatures

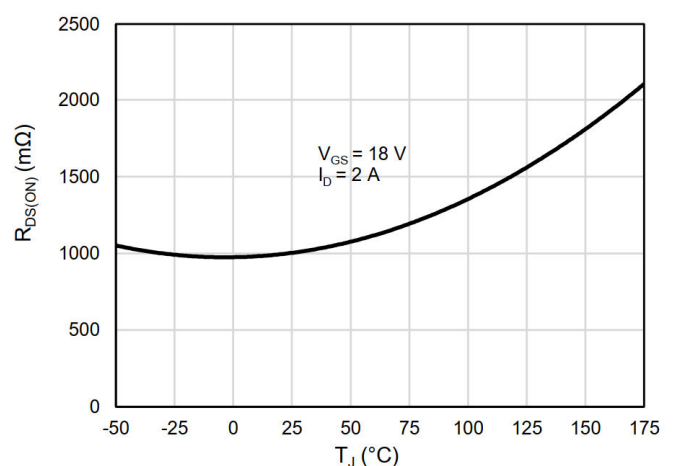


Figure 6: On-Resistance vs. Temperature For Various Gate Voltage

Typical Performance (curves)

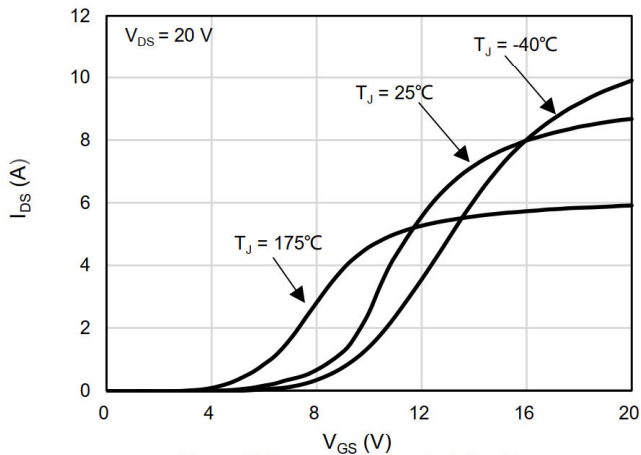


Figure 7: Transfer Characteristics For Various Junction Temperature

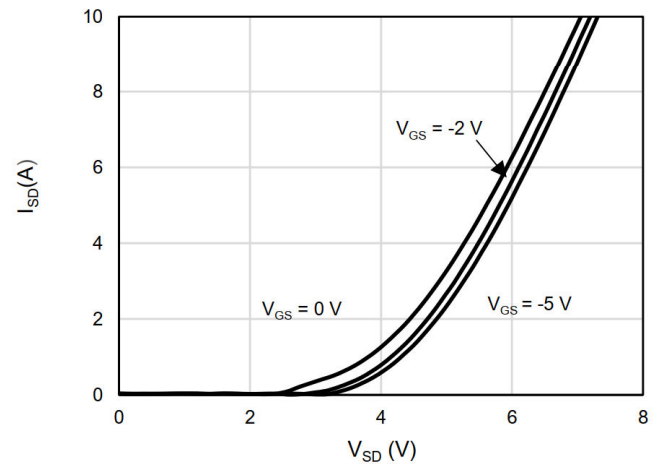


Figure 8: Body Diode Characteristics at -55°C

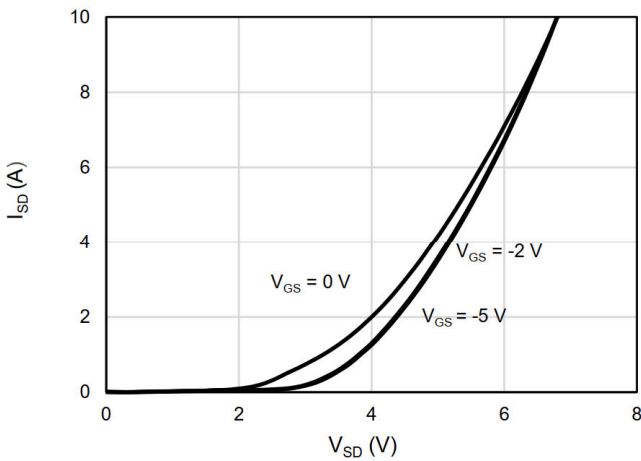


Figure 9: Body Diode Characteristics at 25°C

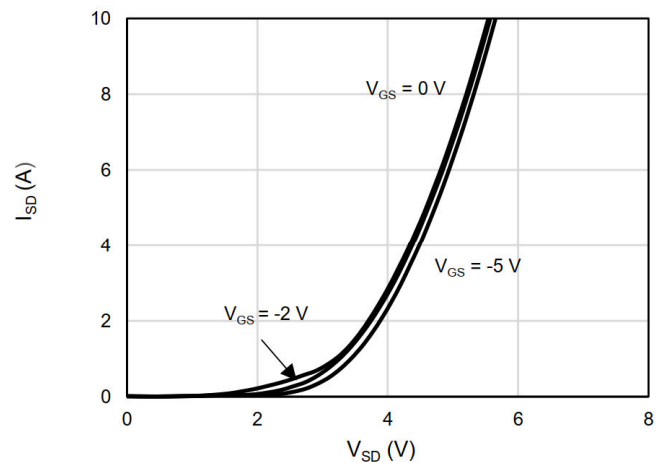


Figure 10: Body Diode Characteristics at 175°C

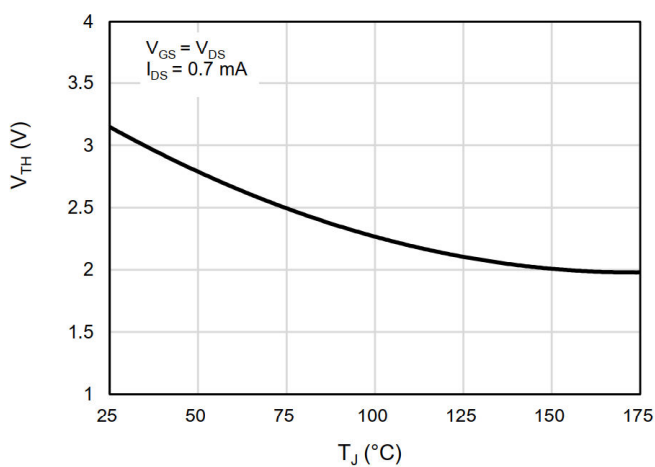


Figure 11: Threshold Voltage vs. Temperature

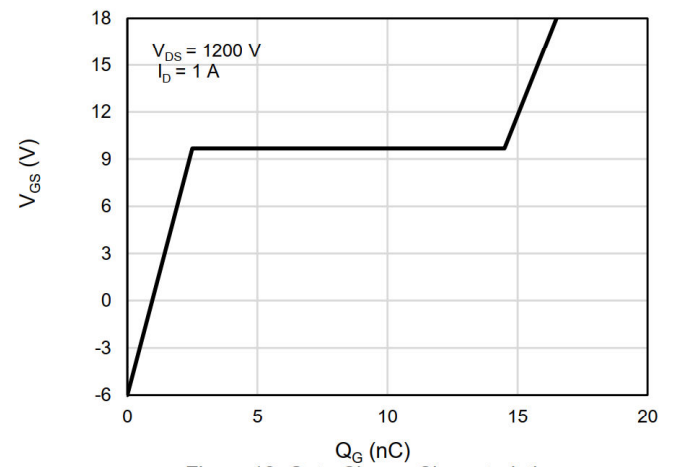


Figure 12: Gate-Charge Characteristics

Typical Performance (curves)

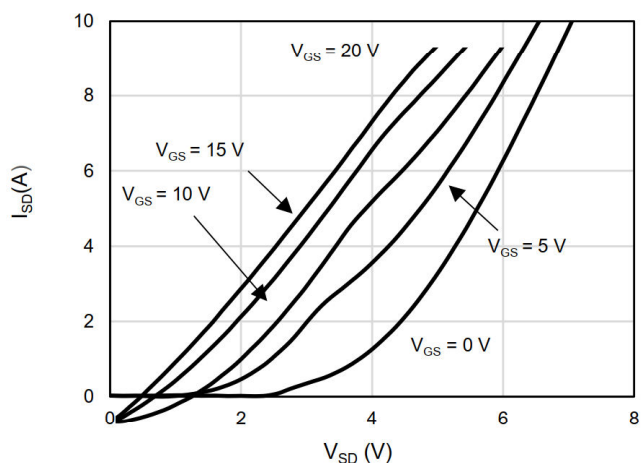


Figure 13: 3rd Quadrant Characteristics at -55°C

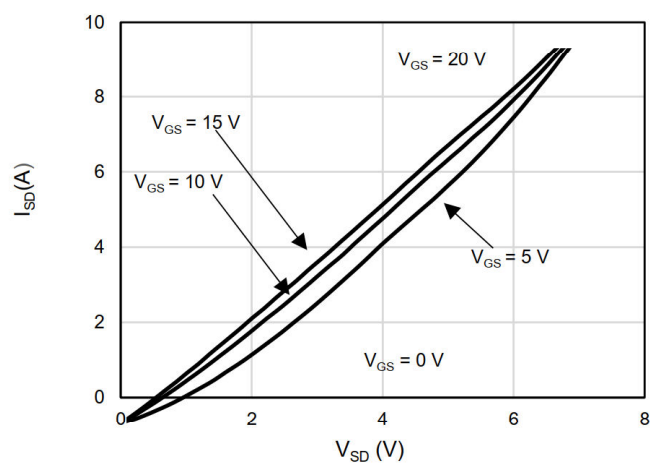


Figure 14: 3rd Quadrant Characteristics at 25°C

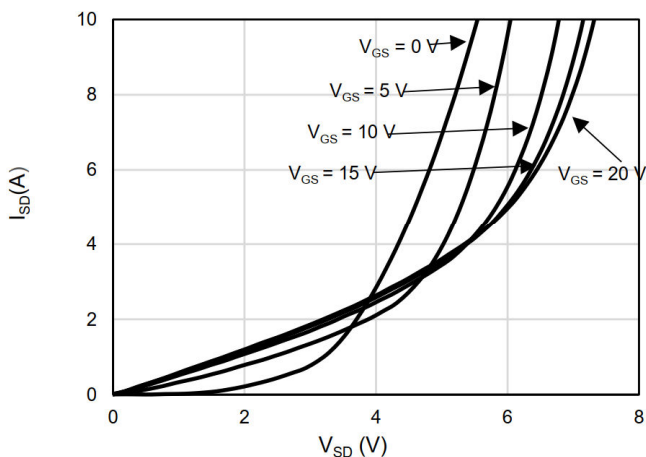


Figure 15: 3rd Quadrant Characteristics at 175°C

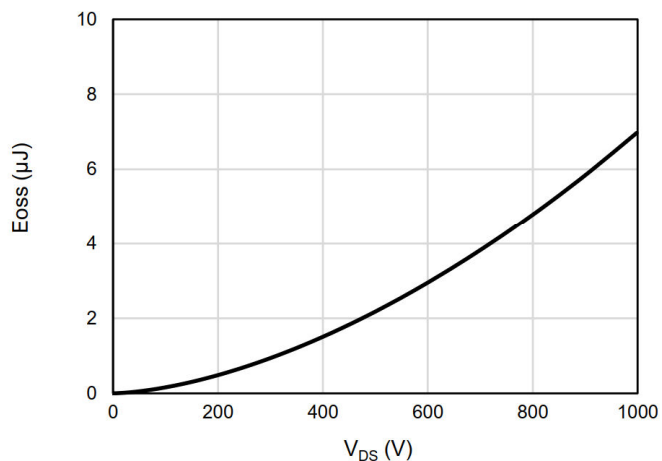


Figure 16: Output Capacitor Stord Energy

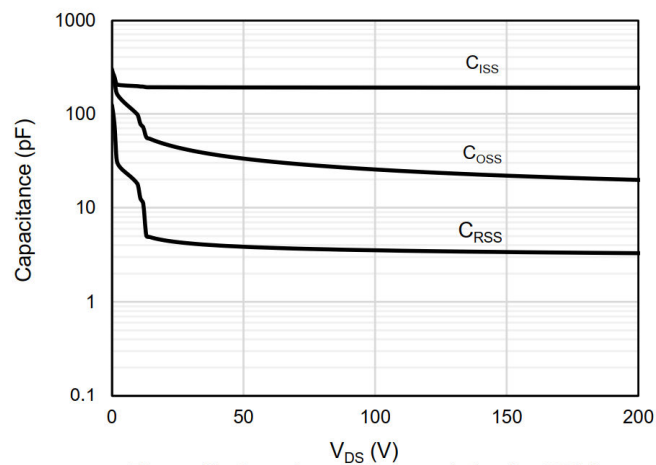


Figure 17: Capacitance Characteristics (0 - 200V)

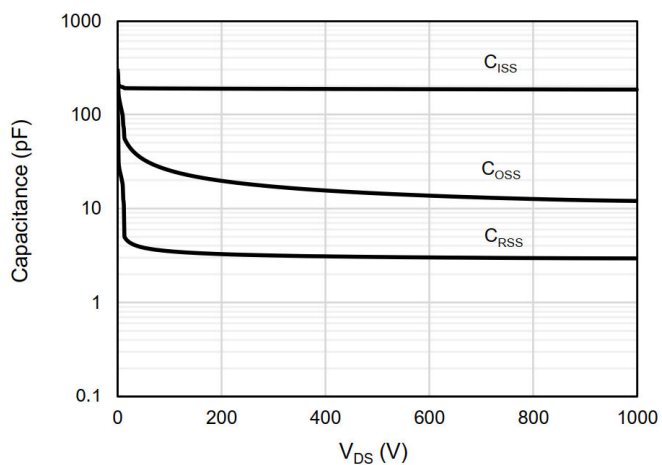
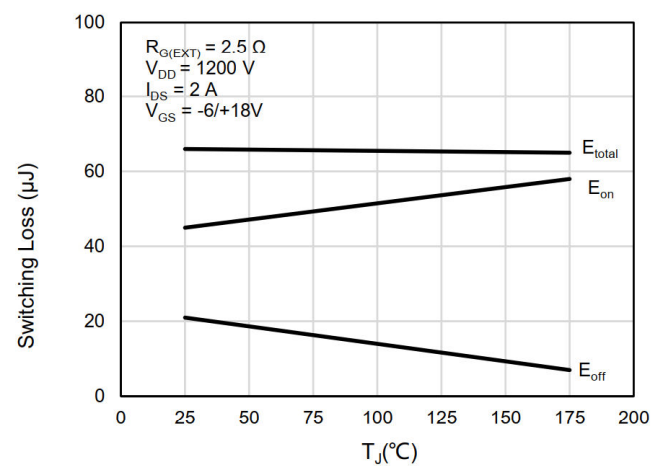
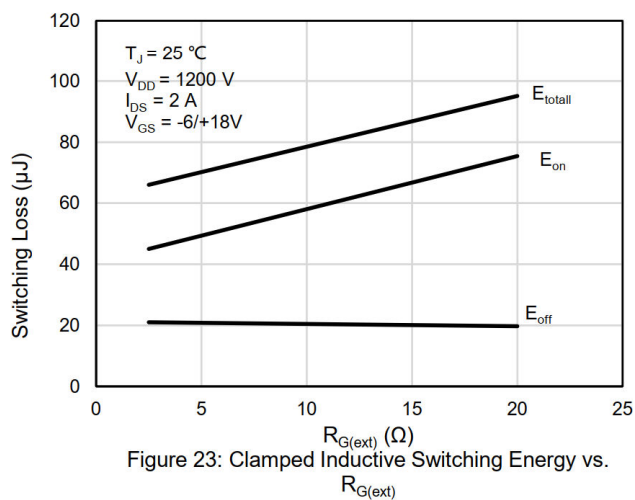
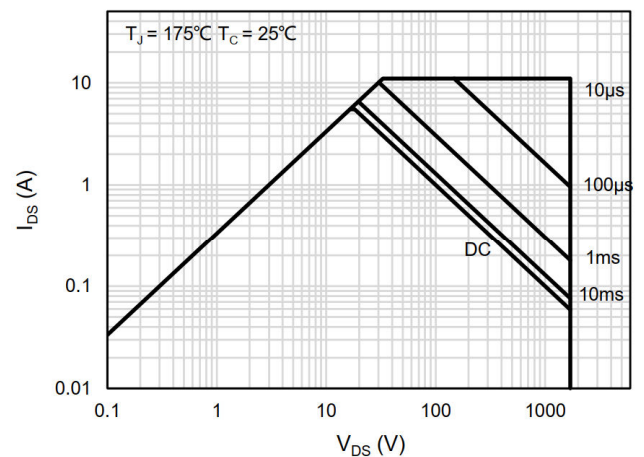
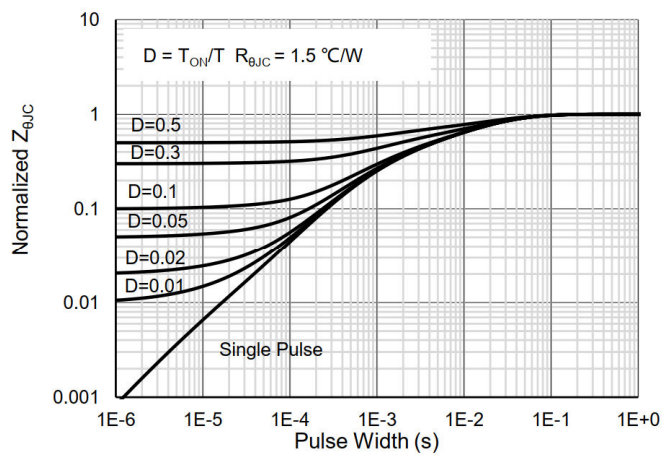
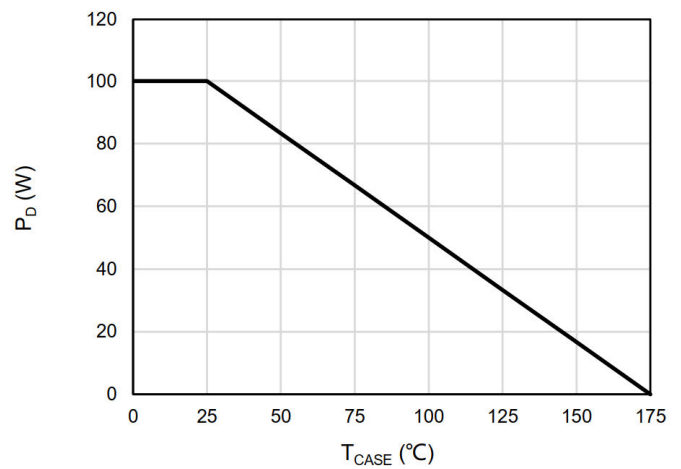
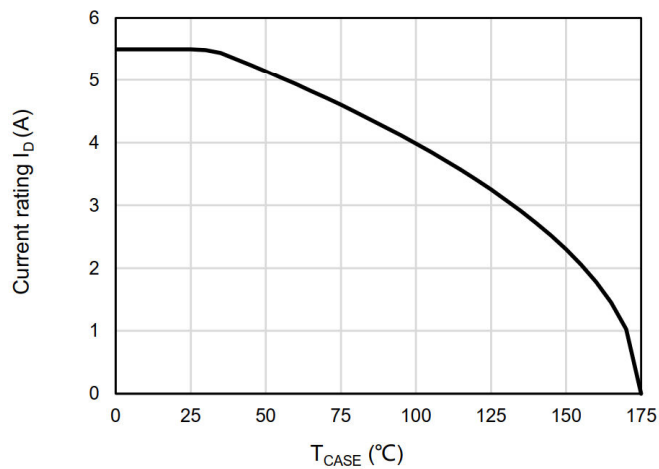


Figure 18: Capacitance Characteristics (0-1000V)

Typical Performance (curves)



Typical Performance (curves)

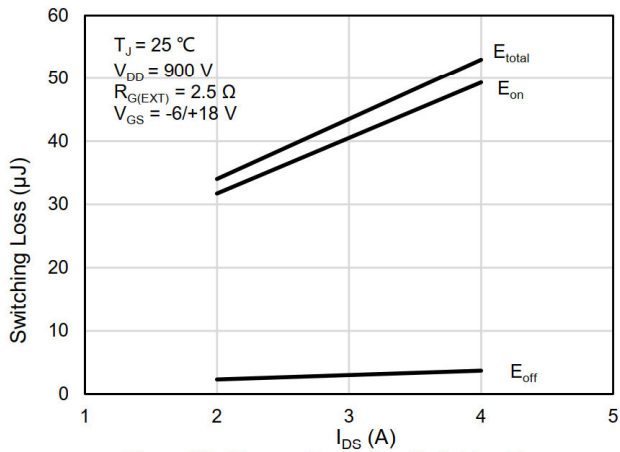


Figure 25: Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 600 \text{ V}$)

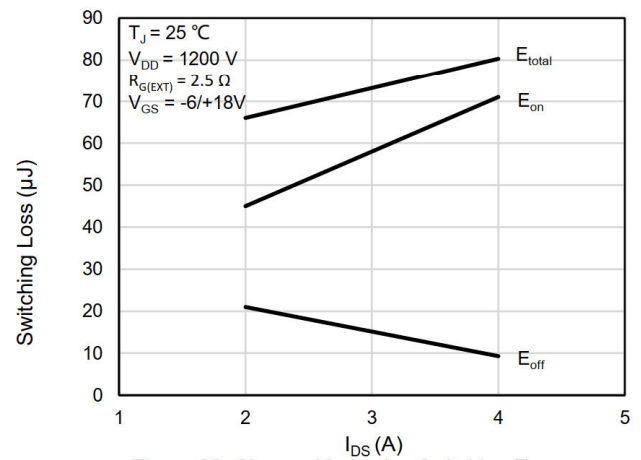


Figure 26: Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 1200 \text{ V}$)

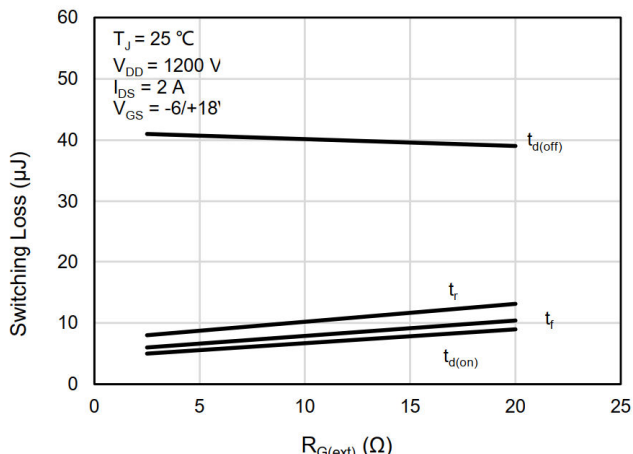


Figure 27: Switching Time vs. $R_{G(EXT)}$

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