NextGen Components,Inc.

PART CODE: NC2M120C20HTNG

SPECIFICATION SHEET

SPECIFICATION SHEET NO.	R0723- NC2M120C20HTNG	
DATE	July 23, 2024	
REVISION	A2	Updated With Most Recent Data
DESCRIPTION AND MAIN PARAMETRICS	Silicon Carbide (SiC) MOSFET, TO-247-4L, NC2M Series, 4 Pins N-Channel, Drain-Source Voltage (V_{DS}): 1200V, Industrial Grade Continuous Drain Current (I_D) @25°C: 126A Drain-Source On-State Resistance $R_{DS(ON)}$: 20mΩ Operating Temperature: -55°C ~ 175°C (TJ) Package in Tube RoHS/RoHS III/REACH compliant and HF Free	
CUSTOMER		
CUSTOMER PART NO.		
CROSS REF. PART NO.		
ORIGINAL MFG/PART NO.	NovuSem/NC2M120C20HT	
PART CODE	NC2M120C20HTNG	

VENDOR APPROVE
Issued/Checked/Approved   
DATE: July 23, 2024

CUSTOMER APPROVE
DATE:

NextGen Components, Inc. sales@NextGenComponent.com www.NextGenComponent.com

SILICON CARBIDE (SiC) MOSFET TO2474L NC2M SERIES

DESCRIPTION

Silicon Carbide (SiC) MOSFET is produced to spec in accordance by NovuSem with industrial standards. The cost-effective NC1M series products drastically lower both static and dynamic losses. In higher frequency applications, our products can shrink system components such as inductors, capacitors, filters, and transformers, which can increase the overall power density and reduce the total system cost.

MAIN FEATURE

- Low Switching Loss
- Short-circuit Capability(>3μs).
- High Avalanche Ruggedness
- 175°C Operating Junction Temperature
- High Blocking Voltage With Low On-resistance
- High Speed Switching With Low Capacitances
- Fast Intrinsic Diode With Low Reverse Recovery (Q rr)
- RoHS/RoHS III/REACH Compliant and HF Free

APPLICATION

- PV Inverters
- Charging Piles
- Energy Storage Systems
- Industrial Power Supply
- Industrial Motors.

SILICON CARBIDE (SiC) MOSFET TO2474L NC2M SERIES

PART CODE GUIDE

RFQ
Request For Quotation

CODE	NAME	KEY SPECIFICATION OPTION
NC2M	Product Series Code	NC1D: Novusem Silicon Carbide (SiC) Schottky Diode Gen 1 Industrial Grade series code NC1M: NovuSem Silicon Carbide (SiC) MOSFET Gen 1 Industrial Grade series code NC2M: NovuSem Silicon Carbide (SiC) MOSFET Gen 2 Industrial Grade series code
120	Drain-Source Voltage (V_{DS}) code	120: 1200V; 65: 650V
C	Material code	C: SiC; S: Silicon
20	Drain-Source On-State Resistance $R_{DS(ON)}$ Code	12:12mΩ ; 20: 20mΩ; 35: 35mΩ; 40: 40mΩ; 75: 75mΩ; 80: 80mΩ
H	Case Code	A: TO-220-2L; D: TO-252; F: TO-220F; G: TO-247-3L; H: TO-247-4L; K: TO-247-2L; M: DFN5X6; R: TO-263-7L; S: TO-263; T: TO-220-3L
T	Package Type Code	T: Tube; R: Tape & Reel
NG	Internal Control Code	Internal Control Code, letter or digits (A~Z, a~z or 1~9) for Special Parametric; Blank: N/A

DIMENSION – See Table 1 (Unit: mm)

1). All dimensions are listed in millimeters, angles are in degrees. 2). All Metal Surfaces are Tin Plate (Matte) except Area of Cut.

Image for Reference

Marking:

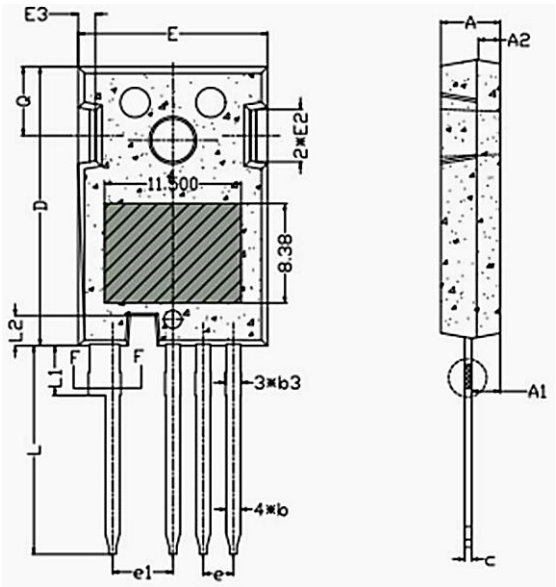
Line 1: Initial Part Code

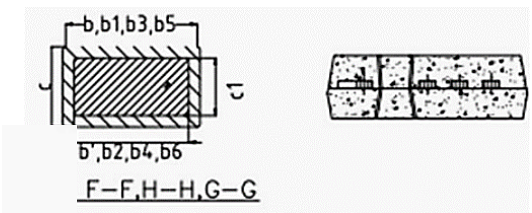
Line 2/Line 3: Internal QC Code

SILICON CARBIDE (SiC) MOSFET TO2474L NC2M SERIES

DIMENSION – See Table 1 (Unit: mm)

Case: TO-247-4L





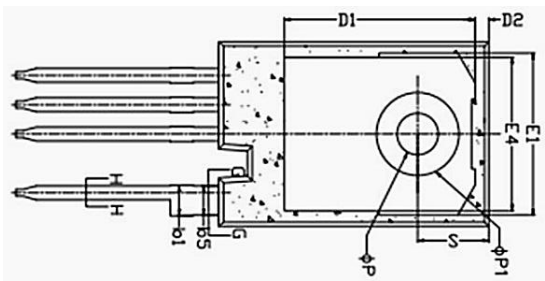


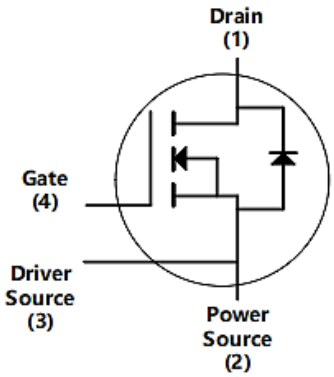
Table 1

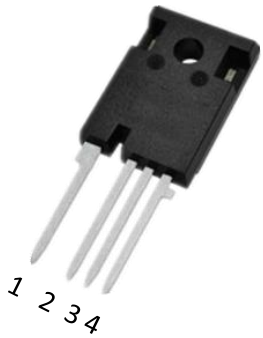
SYMBOL	TO-247-4L		
	Min.	Typ.	Max.
A	4.83	5.02	5.21
A1	2.29	2.41	2.54
A2	1.91	2.00	2.16
b	1.07	1.20	1.36
b1	2.39	2.67	2.94
b2	2.39	2.67	2.84
b3	1.07	1.30	1.60
b4	1.07	1.30	1.50
b5	2.39	2.53	2.69
b6	2.39	2.53	2.64
c	0.55	0.60	0.68
c1	0.55	0.60	0.68
D	23.30	23.45	23.60
D1	16.25	16.55	17.65
D2	0.95	1.19	1.25
E	15.74	15.94	16.13
E1	13.10	14.02	14.15
E2	2.68	4.40	5.10
E3	1.00	1.45	1.90
E4	12.38	13.26	13.43
e	2.54 Basic		
e1	5.08 Basic		
L	17.31	17.57	17.82
L1	3.97	4.19	4.37
L2	3.35	4.19	2.65
ΦP	3.51	3.61	3.65
ΦP1	7.19 Ref.		
Q	5.49	5.79	6.00
S	6.04	6.17	6.30
N*	4.00		

SILICON CARBIDE (SiC) MOSFET TO2474L NC2M SERIES

INTERNAL CIRCUIT DIAGRAM

Pin 1 (D): Drain; Pin 2 (S): Power Source; Pin 3 (S): Driver Source; Pin 4 (G): Gate





1200V N-CHANNEL SiC MOSFET

V_{DS}	I_{D} @ 25°C	$R_{DS(on)}$	PACKAGE/CASE
1200V	126A	20mΩ	TO-247-4L

MAX. RATINGS @Tc=25 °C (Unless Otherwise Specified)

PARAMETER	SYMBOL	TEST CONDITIONS	VALUE	UNIT
Drain-Source Voltage	V_{DSMax}	V_{GS}=0V, I_{D}=100μA	1200	V
Gate-Source Voltage	V_{GSop}	Static	-5/+20	V
Maximum Gate-Source Voltage	V_{GSmax}	Static	-8/+20	V
Continuous Drain Current	I_{D}	V_{GS}=20V, Tc=25°C	126	A
		V_{GS}=20V, Tc=100°C	90	
Pulsed Drain Current	$I_{D(pulse)}$	Pulse width tp limited by T_{jmax}	250	A
Power Dissipation	P_{D}	TC=25°C, Tj=175°C	625	W
Operating Junction Temperature Range	T_{J}		-55 ~ +175	°C
Storage Temperature Range	T_{STG}		-55 ~ +175	°C

ELECTRICAL CHARACTERISTICS @Tc=25 °C (Unless Otherwise Specified) – Part 1

PARAMETER	SYMBOL	CONDITIONS	VALUE			UNIT
			Min.	Typ.	Max.	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V I_D=100μA	1200	-	-	V
Gates Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=20mA	2	3.4	4.5	V
		V_{DS}=V_{GS}, I_D=20mA, T_j=175°C	-	2.4	-	
Zero Gates Voltage Drain Crurent	I_{DSS}	V_{DS}=1200V, V_{GS}=0V	-	1	100	μA
Gates-Source Leakage Crurent	I_{GSS}	V_{GS}=20V, V_{DS}=0V	-	10	100	nA
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=20V, I_D=63A	-	20	30	mΩ
		V_{GS}=20V, I_D=63A, T_j=175°C	-	38	-	
		V_{GS}=18V, I_D=63A,	-	22	35	
		V_{GS}=18V, I_D=63A, T_j=175°C	-	40	-	
Transconductance	g_{fs}	V_{DS}=20V, I_{DS}=63A	-	30	-	S
		V_{DS}=20V, I_{DS}=63A, T_j=175°C	-	35	-	
Turn-On Switching Energy (Body Diode FWD)	E_{on}	V_{DS}=800V, V_{GS}=-5V/20V, I_D=63A, $R_{G(ext)}$=2.5Ω, L=200μH, T_j=25°C FWD=NC2M120C20HTNG	-	629	-	μJ
Turn-Off Switching Energy (Body Diode FWD)	E_{off}		-	392	-	μJ
Turn-On Delay Time	$t_{d(on)}$	V_{DD}=800V, V_{GS}=-5V/20V, I_D=63A, $R_{G(ext)}$=2.5Ω, L=200μH	-	17	-	ns
Rise Time	t_r		-	28	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	43	-	ns
Fall Time	t_f		-	12	-	ns

ELECTRICAL CHARACTERISTICS @Tc=25 °C (Unless Otherwise Specified) – Part 2

PARAMETER	SYMBOL	CONDITIONS	VALUE			UNIT
			Min.	Typ.	Max.	
Gate to Source Charge	Q_{gs}	V_{DS}=800V, V_{GS}=-5V/20V, I_D=63A	-	82	-	nC
Gate to Drain Charge	Q_{gd}		-	114	-	nC
Total Gate Charge	Q_g		-	282	-	nC
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=1000V f=1MHz V_{AC}=25mV	-	4615	-	pF
Output Capacitance	C_{oss}		-	175	-	pF
Reverse Transfer Capacitance	C_{rss}		-	22	-	pF
COSS Stored Energy	E_{oss}		-	111	-	µJ
Internal Gate Resistance	$R_{G(int)}$	f=1MHz, V_{AC}=25mV	-	0.9	-	Ω

REVERSE DIODE CHARACTERISTICS @Tc=25 °C (Unless Otherwise Specified)

PARAMETER	SYMBOL	CONDITIONS	VALUE			UNIT
			Min.	Typ.	Max.	
Diode Forward Voltage	V_{SD}	V_{GS}=-5V, I_{SD}=320A	-	6.5	-	V
		V_{GS}=-5V, I_{SD}=32A, Tj=175°C	-	5.5	-	V
Continuous Diode Forward Current	I_S	V_{GS}=-5V	-	126	-	A
Reverse Recovery Time	t_{rr}	V_{GS}= -5V, I_{SD}=63A V_R=800V, di/dt=2933A/µs	-	23	-	ns
Reverse Recovery Charge	Q_{rr}		-	347	-	nC
Peak Reverse Recovery Current	I_{rrm}		-	26	-	A

THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	VALUE			UNIT
		Min.	Typ.	Max.	
Thermal Resistance from Junction to Case	$R_{\theta JC}$	-	0.24	-	°C/W

TYPICAL PERFORMANCE - For Reference Only

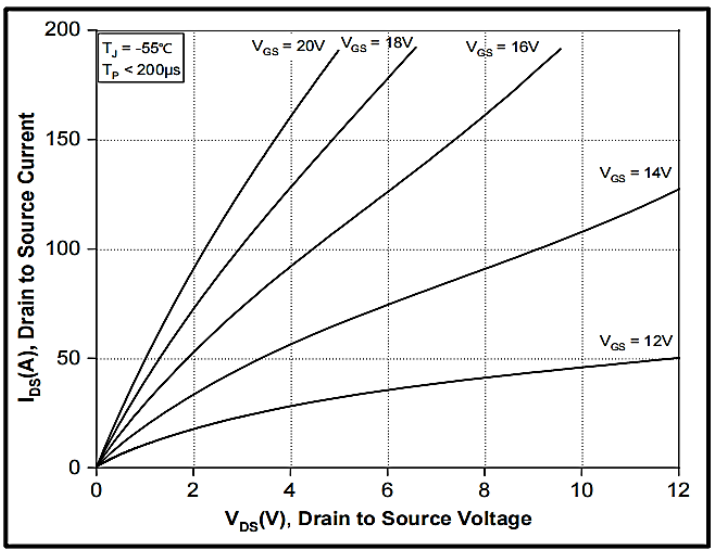


Figure 1. Output Characteristics T_J=-55°C

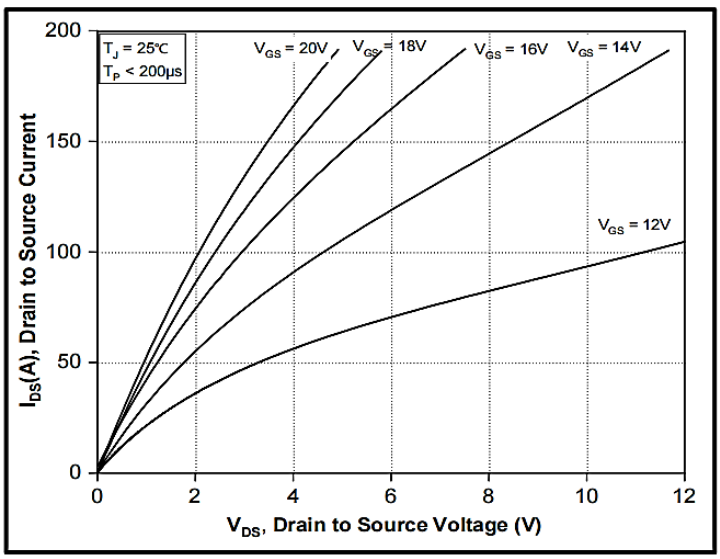


Figure 2. Output Characteristics T_J=25°C

TYPICAL PERFORMANCE - For Reference Only

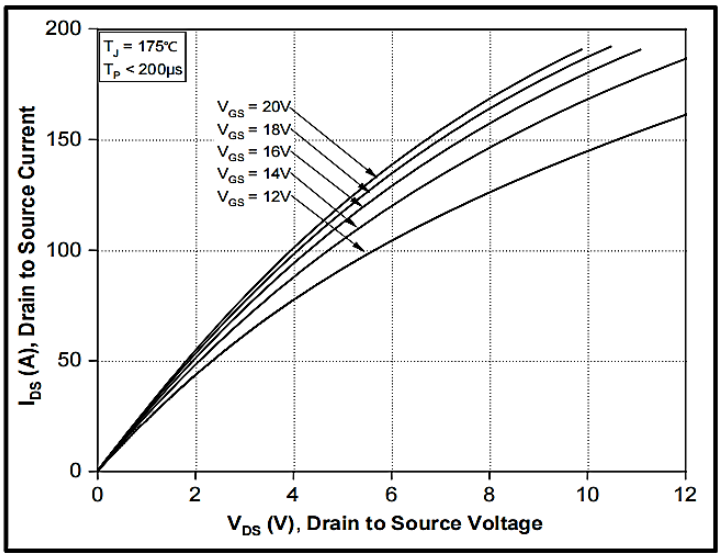


Figure 3. Output Characteristics T_j=175°C

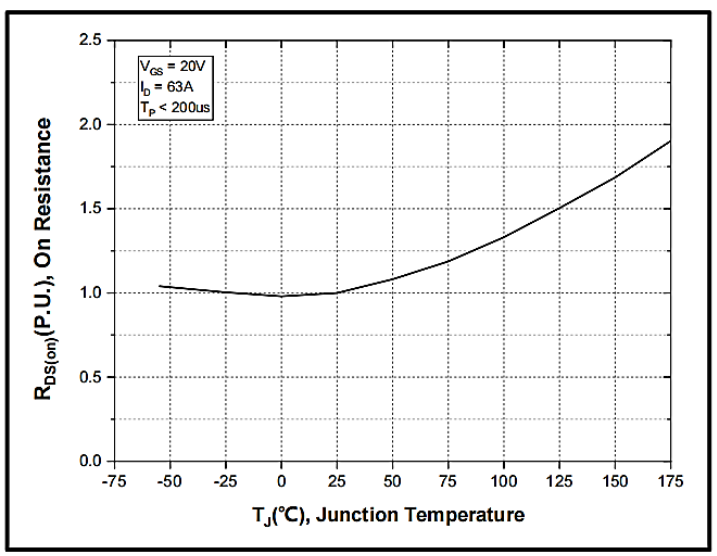


Figure 4. Normalized On-Resistance vs. Temperature

TYPICAL PERFORMANCE - For Reference Only

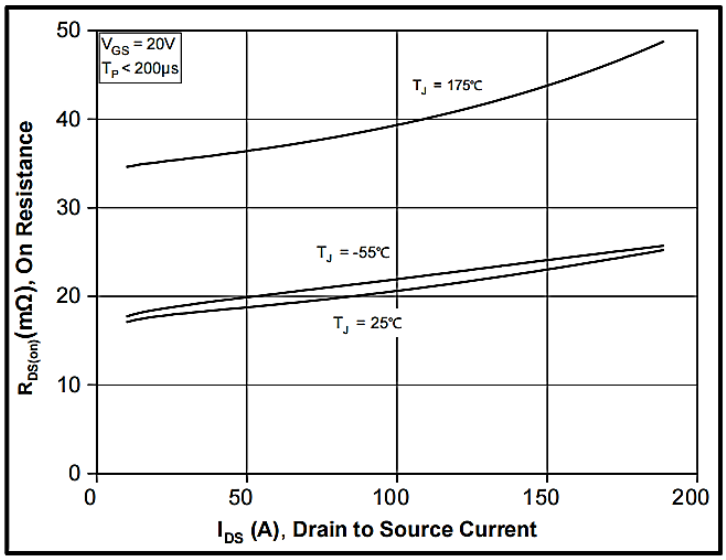


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

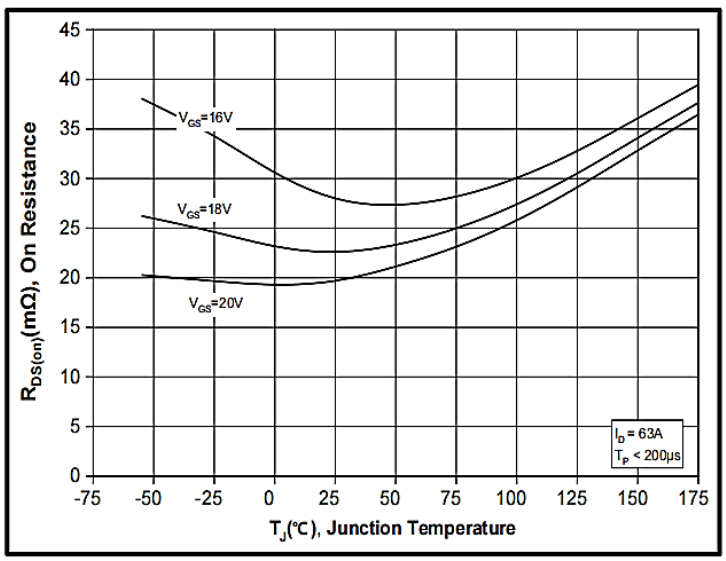


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

TYPICAL PERFORMANCE - For Reference Only

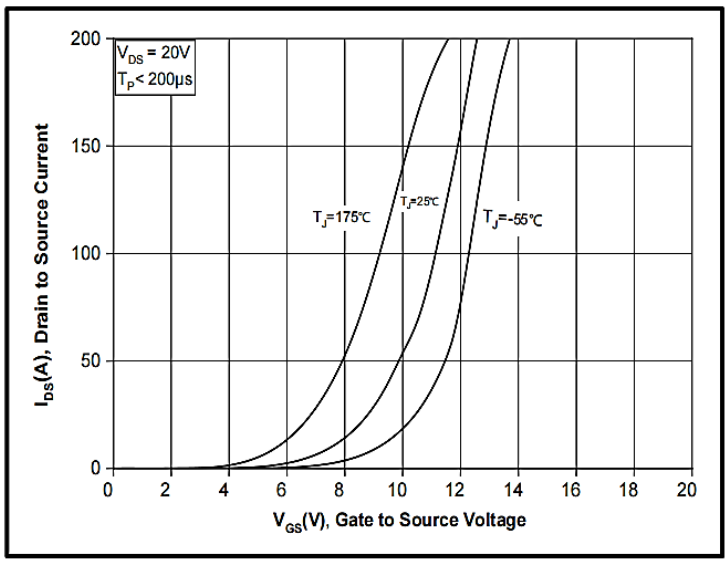


Figure 7. Transfer Characteristic for Various Junction Temperatures

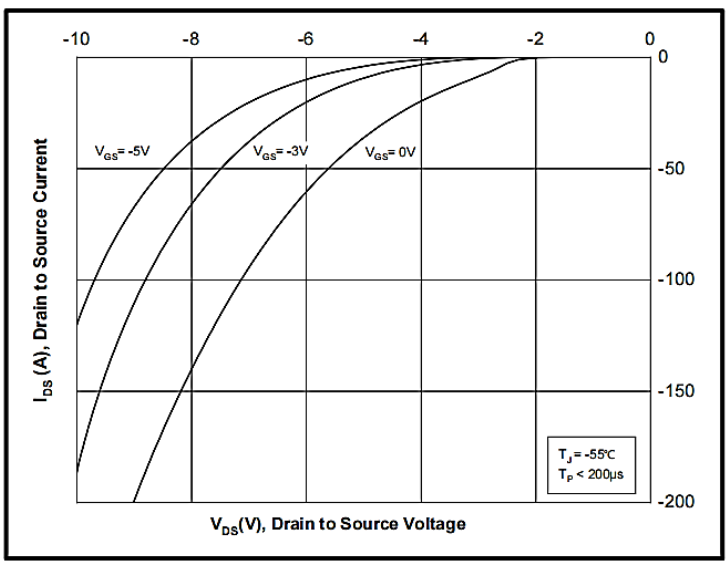


Figure 8. Body Diode Characteristic at -55°C

TYPICAL PERFORMANCE - For Reference Only

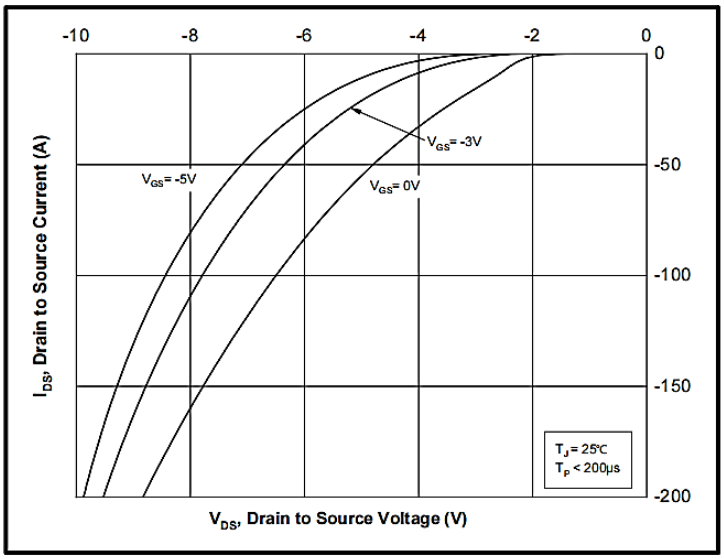


Figure 9. Body Diode Characteristic at 25°C

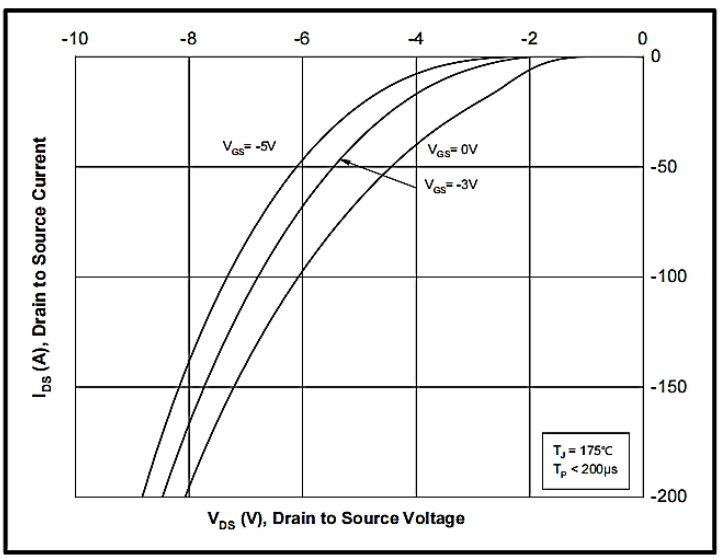


Figure 10. Body Diode Characteristic at 175°C

TYPICAL PERFORMANCE - For Reference Only

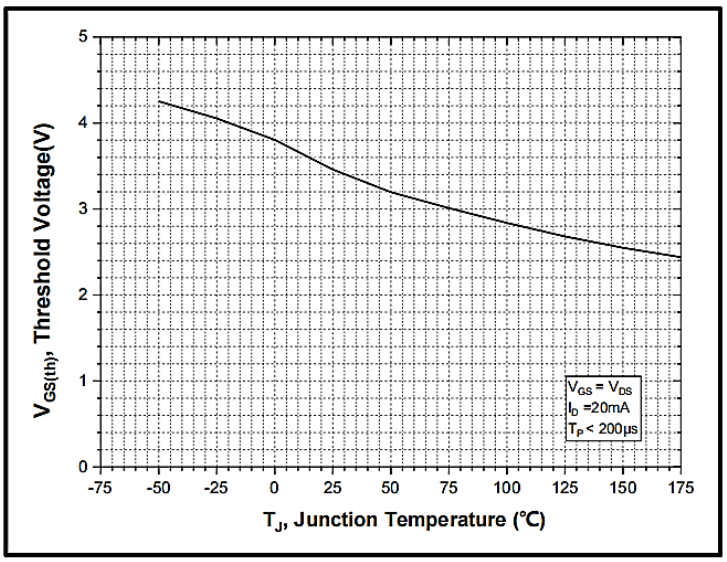


Figure 11. Threshold Voltage vs. Temperature

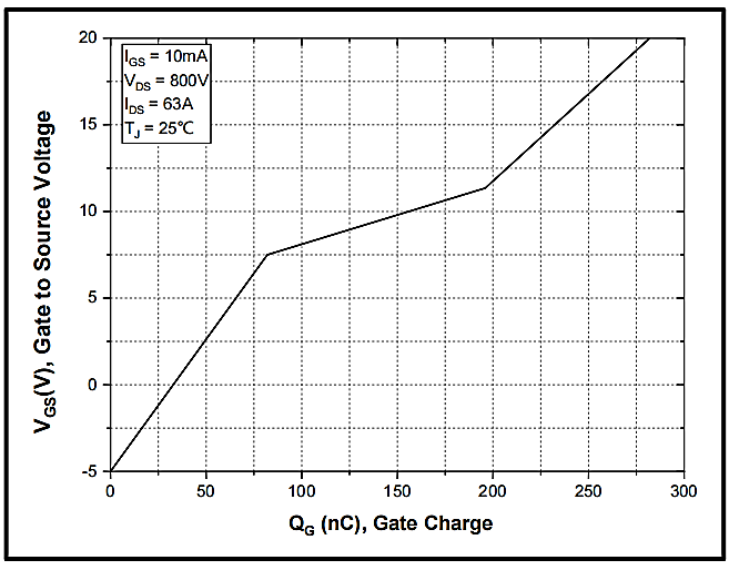


Figure 12. Gate Charge Characteristics

TYPICAL PERFORMANCE - For Reference Only

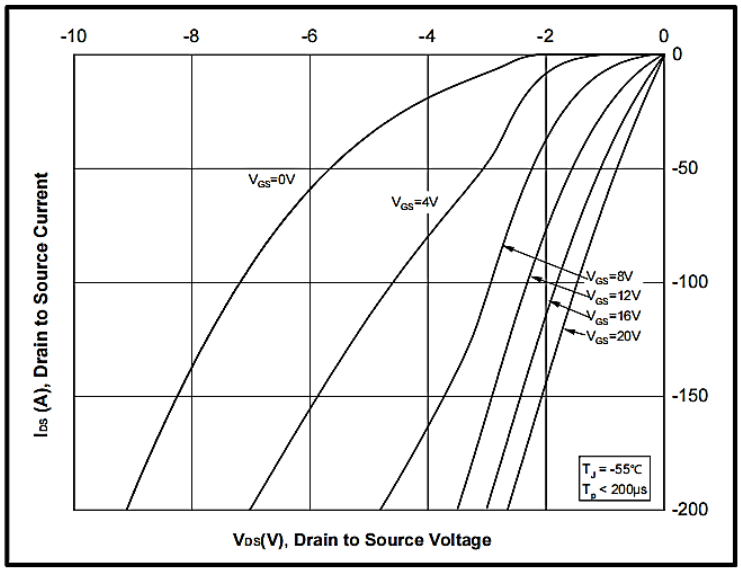


Figure 13. 3rd Quadrant Characteristic at -55°C

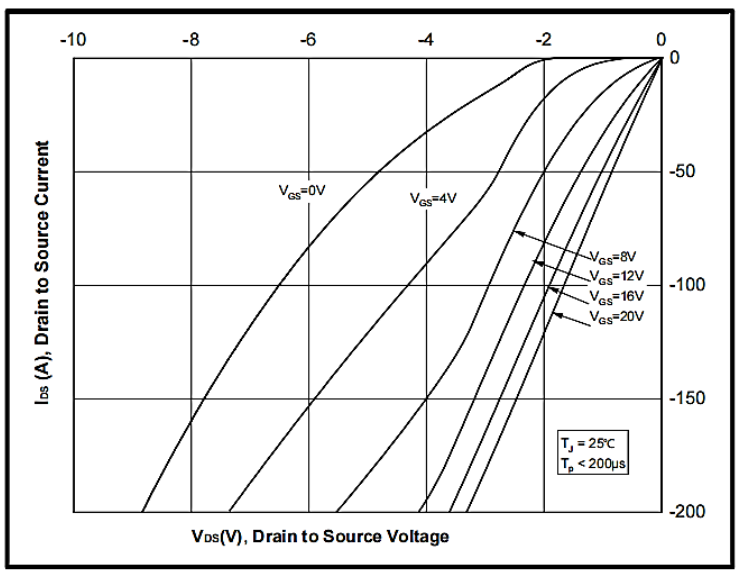


Figure 14. 3rd Quadrant Characteristic at 25°C

TYPICAL PERFORMANCE - For Reference Only

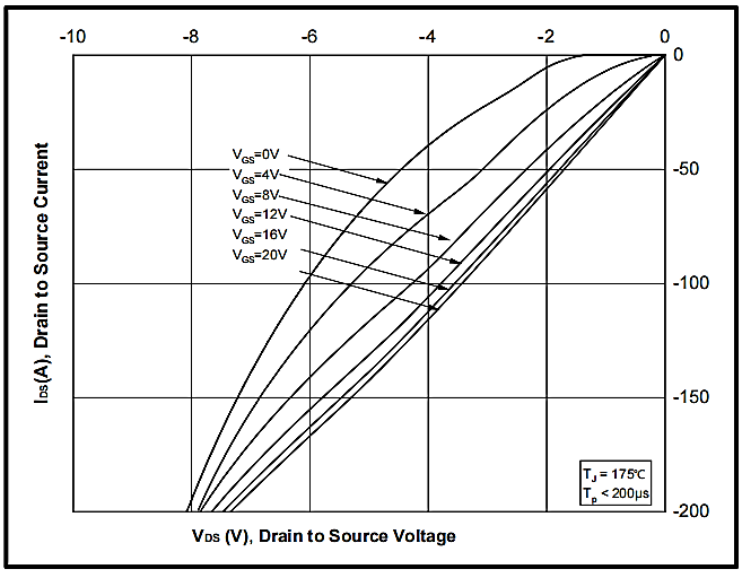


Figure 15. 3rd Quadrant Characteristic at 175°C

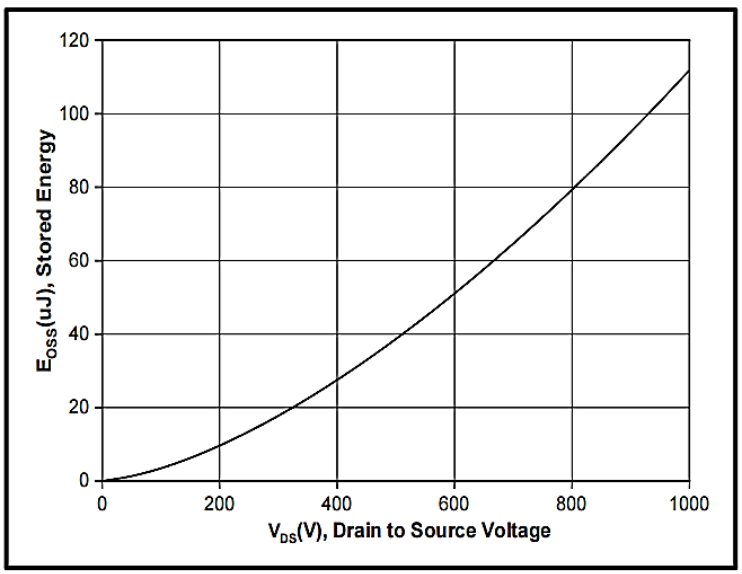


Figure 16. Output Capacitor Stored Energy

TYPICAL PERFORMANCE - For Reference Only

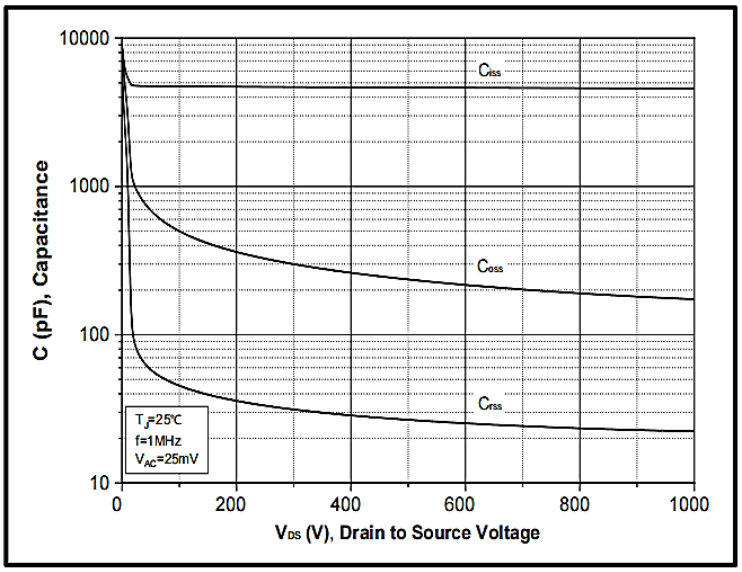


Figure 17. Capacitances vs. Drain-Source Voltage

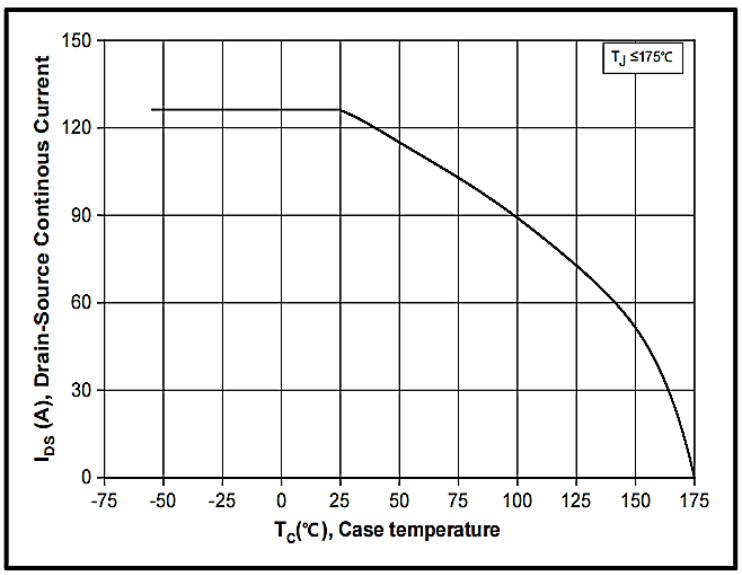


Figure 18. Continuous Drain Current Derating vs. Case Temperature

TYPICAL PERFORMANCE - For Reference Only

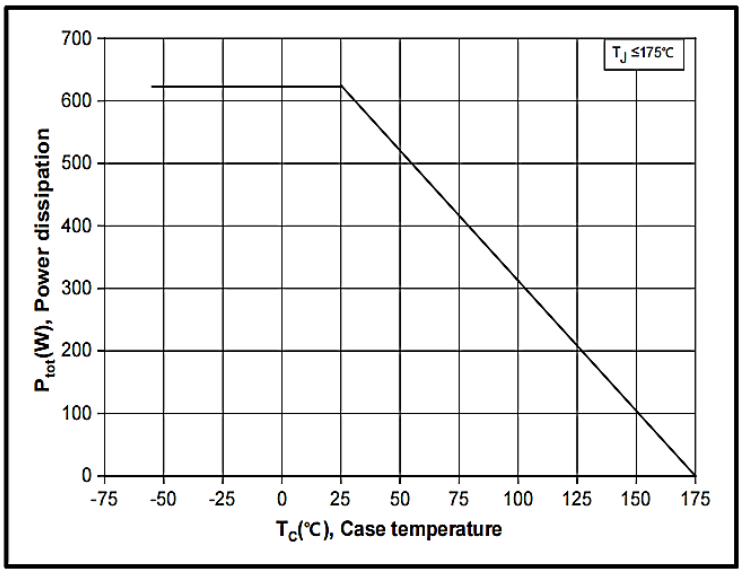


Figure 19. Maximum Power Dissipation Derating vs. Case Temperature

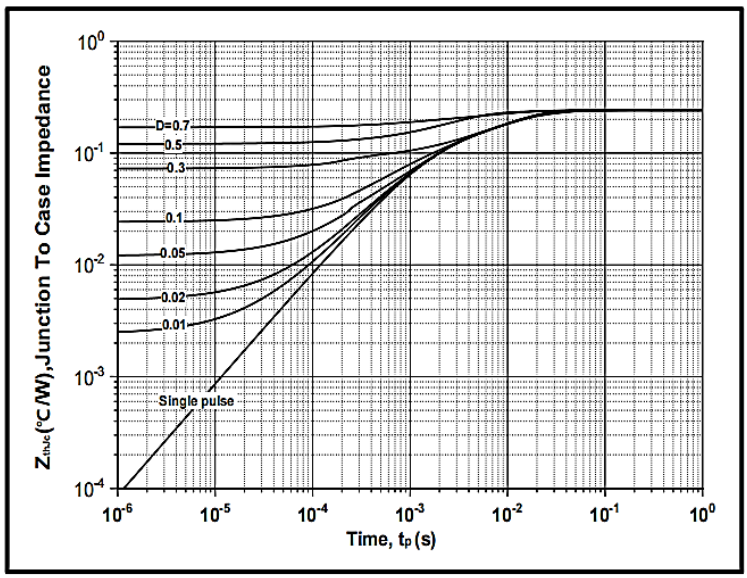


Figure 20. Transient Thermal Impedance (Junction - Case)

TYPICAL PERFORMANCE - For Reference Only

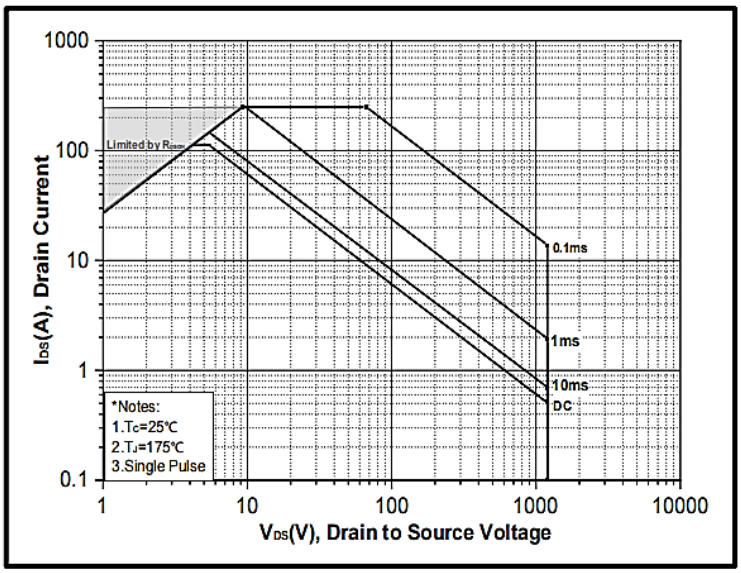


Figure 21. Safe Operating Area

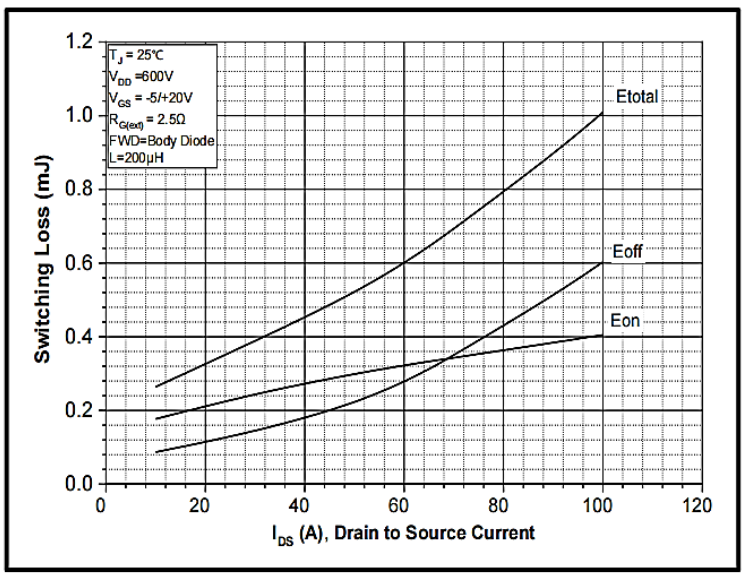


Figure 22. Clamped Inductive Switching Energy vs. Drain Current (V_{DD}=600V)

TYPICAL PERFORMANCE - For Reference Only

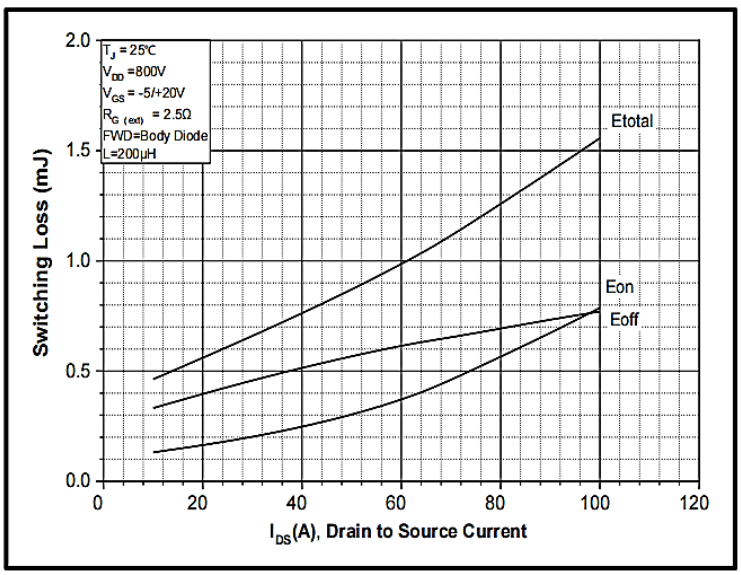


Figure 23. Clamped Inductive Switching Energy vs. Drain Current (V_{DD}=800V)

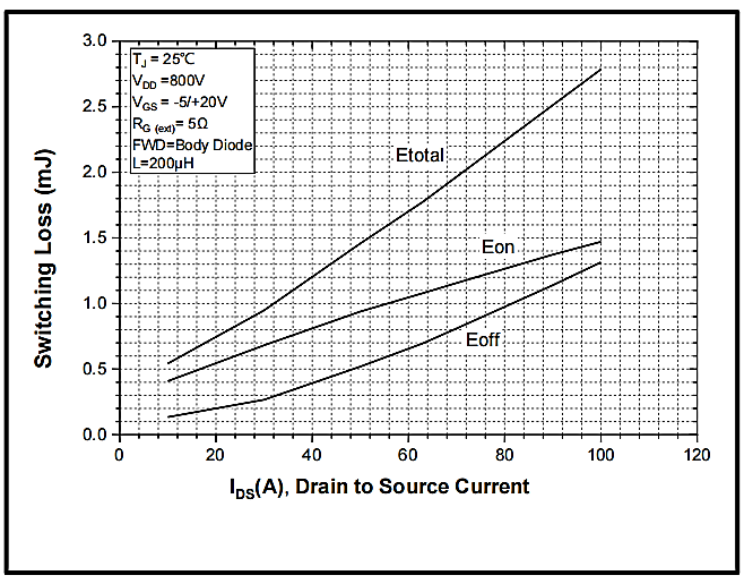


Figure 24. Clamped Inductive Switching Energy vs. Drain Current (V_{DD}=800V, $R_{G(ext}$=5Ω)

TYPICAL PERFORMANCE - For Reference Only

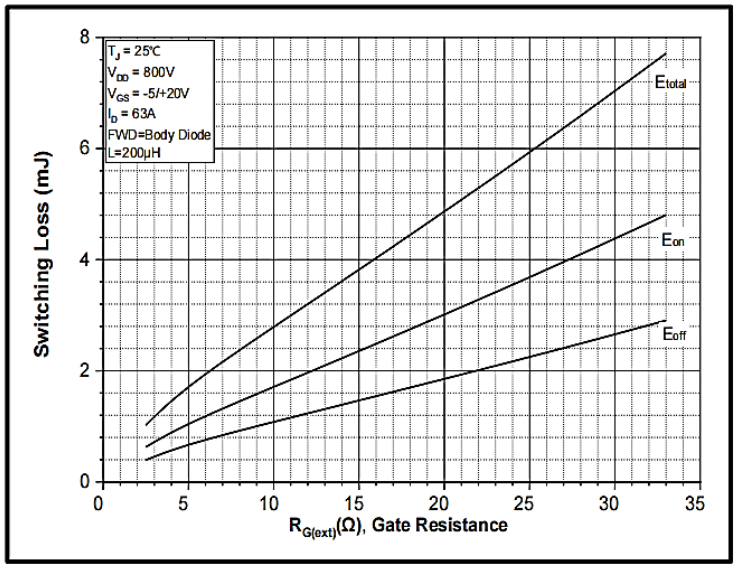


Figure 25. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

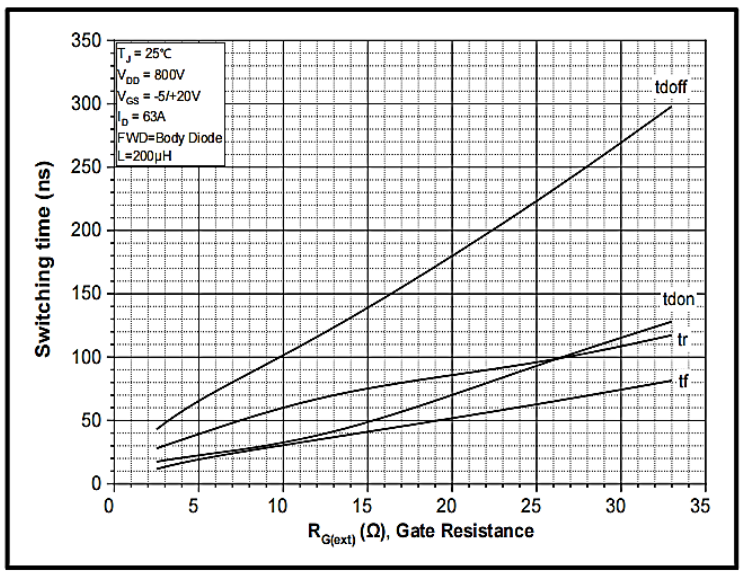


Figure 26. Switching Time vs. $R_{G(ext)}$

IMPORTANT NOTES AND DISCLAIMER

1. ROHS COMPLIANCE: The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU RoHS Directive (EU) 2015/863 EC (RoHS3). RoHS Test Report for this product can be obtained can be obtained at Download Center.
2. REACH COMPLIANCE: REACH substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, REACH Test Report for this product can be obtained can be obtained at Download Center.
3. All Product parametric performance is indicated in the Electrical Characteristics for the listed herein test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
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