SPECIFICATION SHEET

SILICON CARBIDE (SiC) MOSFET WAFER NC1M SERIES

SPECIFICATION SHEET NO.	S0110- NC1M120C12WCNG	
ORIGINAL MFG/PART NO.	NovuSem/NC1M120C12W	
NEXTGEN PART CODE	NC1M120C12WCNG	Indicate This Code For RFQ/Order
DATE	Jan. 10, 2025	
REVISION	A2	Updated With Most Recent Data
DESCRIPTION AND MAIN PARAMETRICS	Silicon Carbide (SiC) MOSFET, Wafer, NC1M Series, Drain-Source Voltage (VDS): 1200V, Industrial Grade Continuous Drain Current (ID) @25°C: 214A Drain-Source On-State Resistance RDS(ON): 12mΩ Operating Temperature: -55°C ~ 175°C (TJ) Package in Wafer Case RoHS/RoHS III/REACH Compliant	
CUSTOMER		
CUSTOMER PART NUMBER		
CROSS REF. PART NUMBER		
MEMO		

VENDOR APPROVE
Issued/Checked/Approved NextGen Components, Inc. Mandy Xu NextGen Components, Inc. Ruby Zhang NextGen Components, Inc. Jack Zhang
Effective Date: Jan. 10, 2025

CUSTOMER APPROVE
Date:

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.

Image shown is a representation only. Exact specifications should be obtained from the product dimension.

MAIN FEATURE

- Low Switching Loss
- 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

APPLICATION

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

ELECTRICAL CHARACTERISTICS

- See Page 5 ~Page 7.
- All Parameters are Subject To NextGen Components' Final Confirmation

HOW TO ORDER

- Please Follow Up Part Code Guide And Indicate NextGen Part Code NC1M120C12WCNG For RFQ and Order.

PART CODE GUIDE

RFQ
Request For Quotation

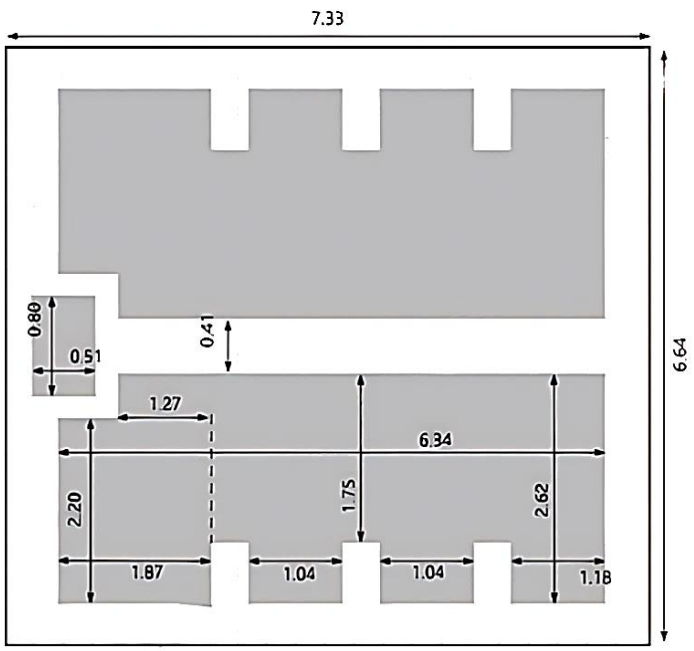
CODE	NAME	KEY SPECIFICATION OPTION
NC1M	Product Series Code	NC1D: Novusem Silicon Carbide (SiC) Schottky Diode Gen 1 Industrial Grade series code NC1M: NovuSem Silicon Carbide (SiC) MOSFET Gen 1 Industrial Grade series code
120	Drain-Source Voltage (V_{DS})	120: 1200V; 65: 650V
C	Material code	C: SiC; S: Silicon
12	Drain-Source On-State Resistance $R_{DS(ON)}$ Code	12:12mΩ ; 40: 40mΩ; 75: 75mΩ; 80: 80mΩ
W	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 W: Wafer
C	Package Type	C: Wafer Case; T: Tube; R: Tape & Reel
NG	Special/Custom Parameters Code	letter or digits (A~Z, a~z or 1~9) for Special Parametric; Blank: N/A

MECHANICAL PARAMETERS

Die Size	7.33mm × 6.64mm (Including Scribe Width)
Thickness	175 ± 15 µm
Source Pad Size	See Pad Layout
Gate Pad Size	0.51mm × 0.80mm
Scribe Line	80 µm

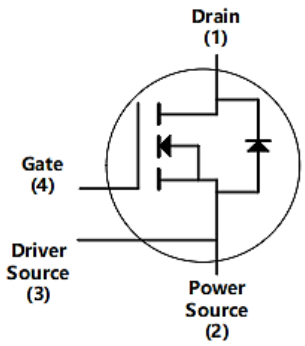
Wafer Size	6 inch
Topside Metallization	Al (4µm)
Backside Metallization	Ti (0.2µm)- Ni (0.3µm)- Ag (2µm)
Passivation	Polymide

PAD LAYOUT - Unit: mm, Including Scribe Width



INTERNAL CIRCUIT DIAGRAM

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



1200V 12mΩ SiC MOSFET

V_{DS}	I_{D} @ 25°C	$R_{DS(on)}$	PACKAGE/CASE	Die Size (mm)
1200V	214A	12mΩ	Wafer	7.33 × 6.64

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
Max. Gate-Source Voltage	V_{GSMax}	Static	-8/+22	V
Continuous Drain Current	I_{D}	V_{GS}=20V, Tc=25°C	214	A
		V_{GS}=20V, Tc=100°C	151	
Pulsed Drain Current	$I_{D(pulse)}$	Pulse width tp limited by T_{jmax}	400	A
Operating Junction Temperature Range	T_{J}		-55 ~ +175	°C
Storage Temperature Range	T_{STG}		-55 ~ +175	°C
Maximum Processing Temperature	T_{Proc}		325	°C

Note: *1. Assume RθJC Thermal Resistance of 0.16°C/W or less *2. Verified by design

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

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=40mA	2.0	2.7	3.5	V
		V_{DS}=V_{GS}, I_D=40mA, T_j=175°C	-	1.9	-	
Zero Gate Voltage Drain Crurent	I_{DSS}	V_{DS}=1200V, V_{GS}=0V	-	2	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=100A	-	12	20	mΩ
		V_{GS}=20V, I_D=100A, T_j=175°C	-	20	-	
		V_{GS}=18V, I_D=100A	-	13	25	
		V_{GS}=18V, I_D=100A, T_j=175°C	-	21	-	
Transconductance	g_{fs}	V_{DS}=20V, I_{DS}=100A	-	60	-	S
		V_{DS}=20V, I_{DS}=100A, T_j=175°C	-	52	-	
Gate to Source Charge	Q_{gs}	V_{DS}=800V, V_{GS}=-5V/20V, I_D=100A	-	215	-	nC
Gate to Drain Charge	Q_{gd}		-	179	-	
Total Gate Charge	Q_g		-	577	-	
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=1000V f=1MHz V_{AC}=25mV	-	8330	-	pF
Output Capacitance	C_{oss}		-	343	-	
Reverse Transfer Capacitance	C_{rss}		-	57	-	
C_{OSS} Stored Energy	E_{oss}		-	217	-	μJ
Internal Gate Resistance	$R_{G(int)}$	f=1MHz, V_{AC}=25mV	-	0.8	-	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} =50A	-	4.7	-	V
		V_{GS} =-5V, I_{SD} =50A, Tj=175°C	-	3.8	-	V
Reverse Recovery Time	t_{rr}	V_{GS} =-5V, I_{SD} =100A V_R=800V, di/dt=1597A/µs	-	46	-	ns
Reverse Recovery Charge	Q_{rr}		-	1	-	µC
Peak Reverse Recovery Current	I_{rrm}		-	37	-	A

TYPICAL PERFORMANCE - For Reference Only

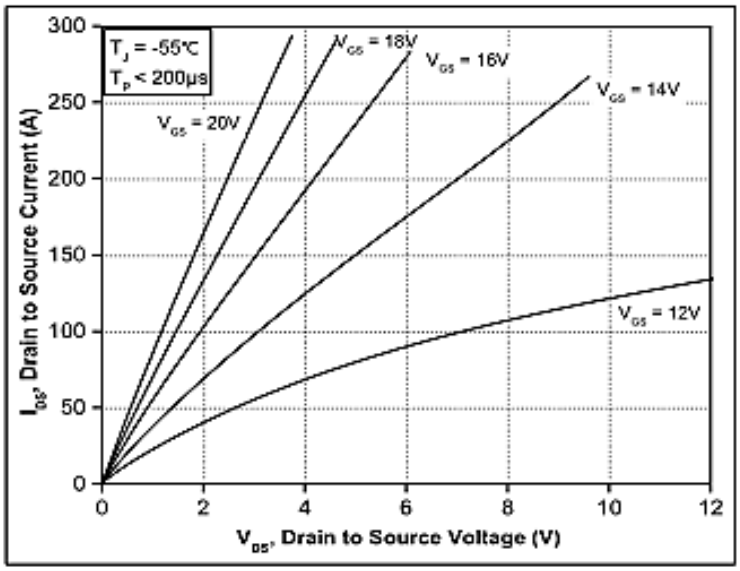


Figure 1. Output Characteristics T_J=-55°C

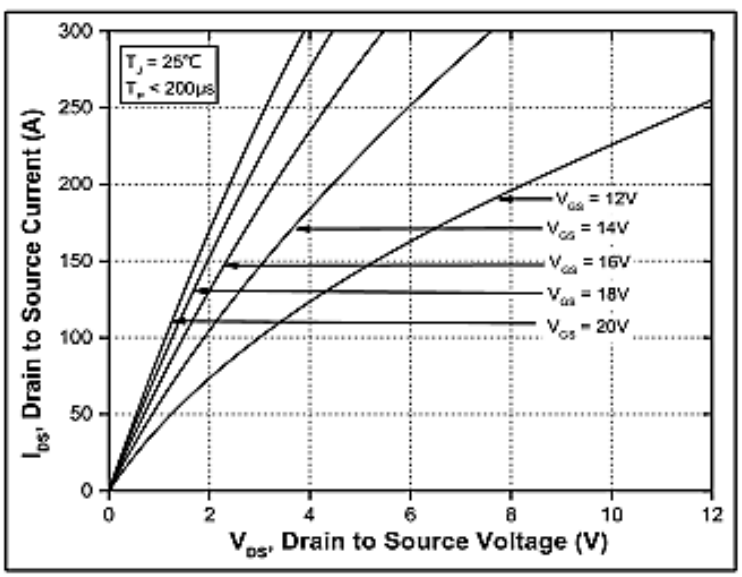


Figure 2. Output Characteristics T_J=25°C

TYPICAL PERFORMANCE - For Reference Only

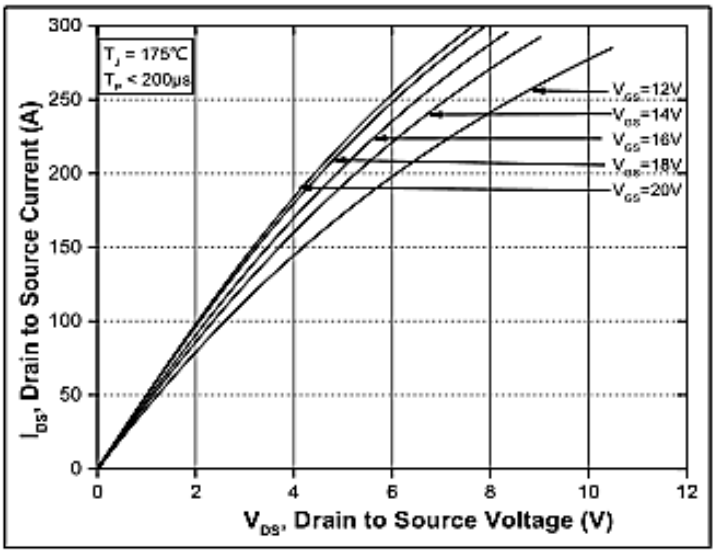


Figure 3. Output Characteristics T_J=175°C

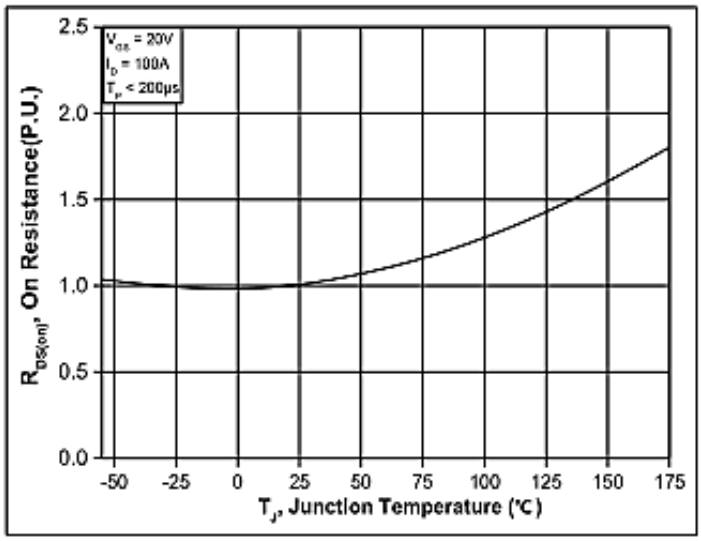


Figure 4. Normalized On-Resistance vs. Temperature

TYPICAL PERFORMANCE - For Reference Only

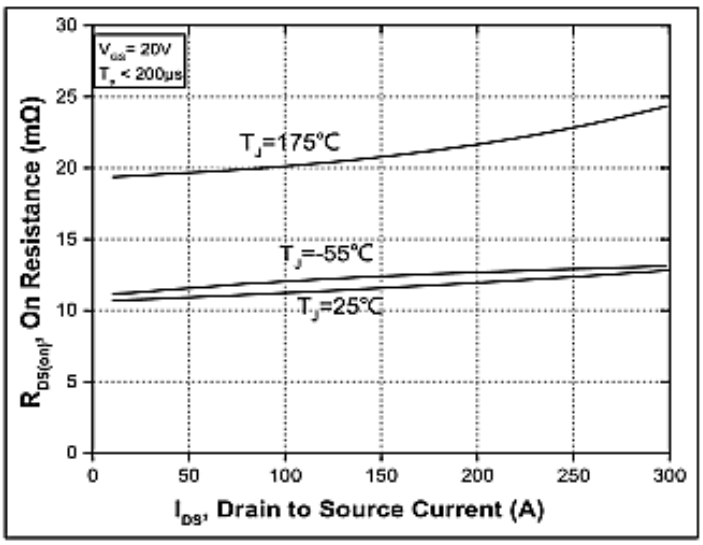


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

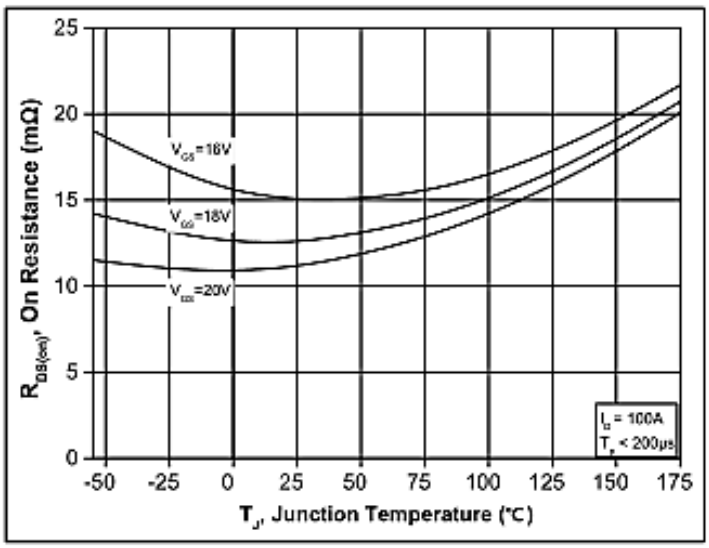


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

TYPICAL PERFORMANCE - For Reference Only

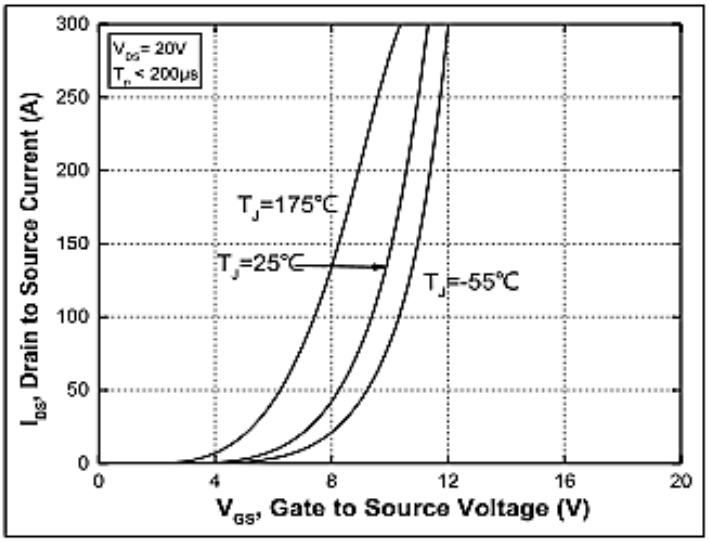


Figure 7. Transfer Characteristic for Various Junction Temperatures

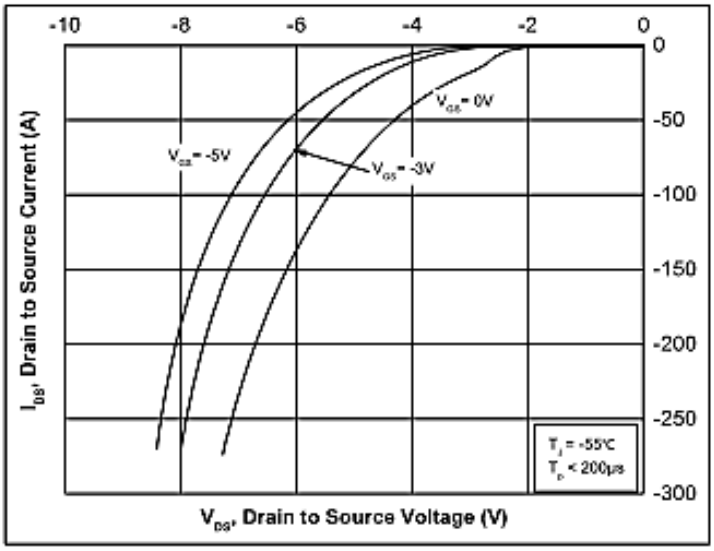


Figure 8. Body Diode Characteristic at -55°C

TYPICAL PERFORMANCE - For Reference Only

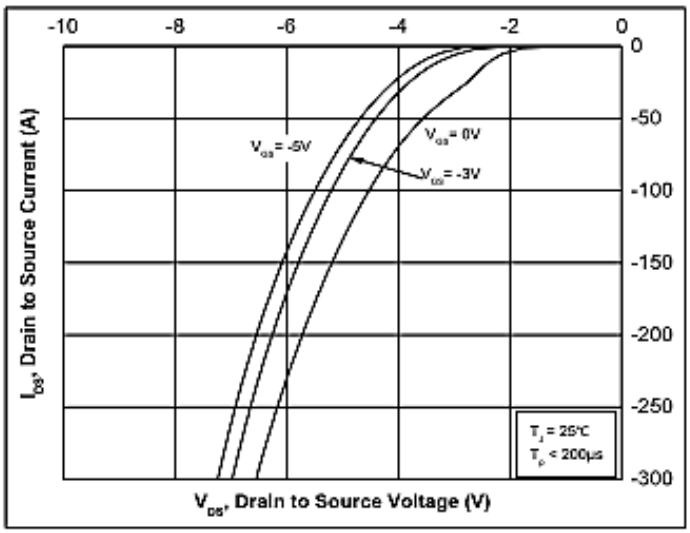


Figure 9. Body Diode Characteristic at 25°C

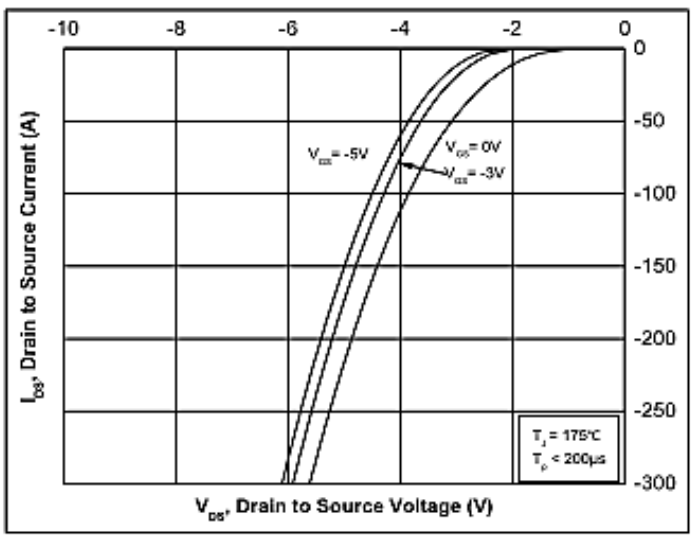


Figure 10. Body Diode Characteristic at 175°C

TYPICAL PERFORMANCE - For Reference Only

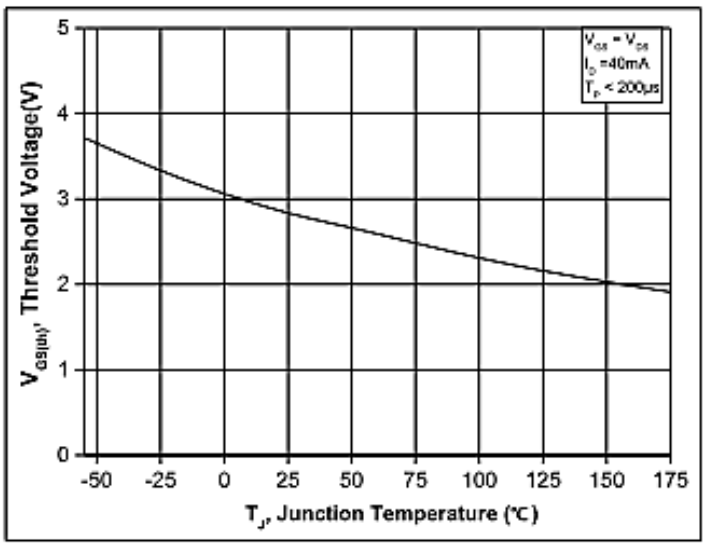


Figure 11. Threshold Voltage vs. Temperature

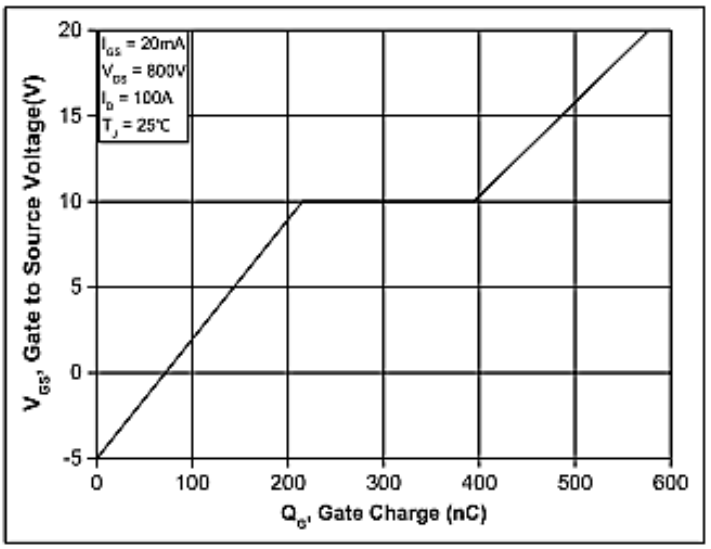


Figure 12. Gate Charge Characteristics

TYPICAL PERFORMANCE - For Reference Only

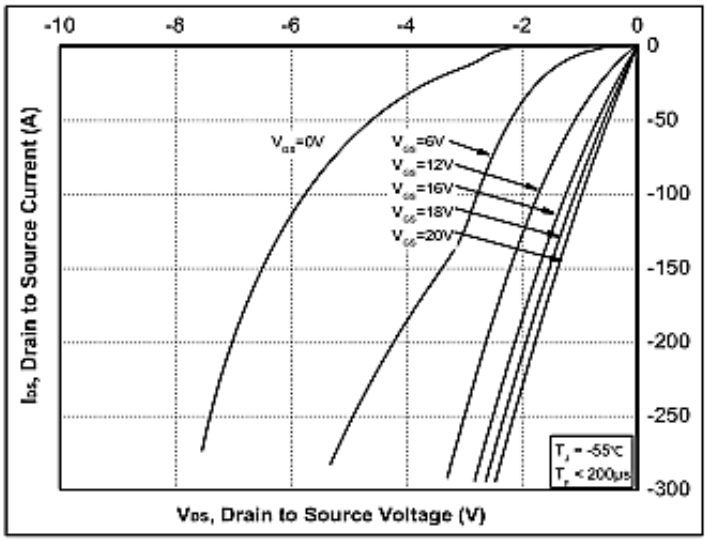


Figure 13. 3rd Quadrant Characteristic at -55°C

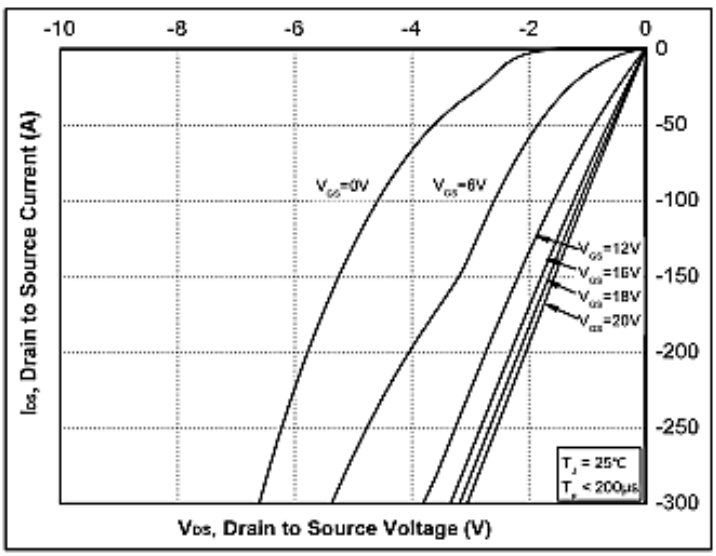


Figure 14. 3rd Quadrant Characteristic at 25°C

TYPICAL PERFORMANCE - For Reference Only

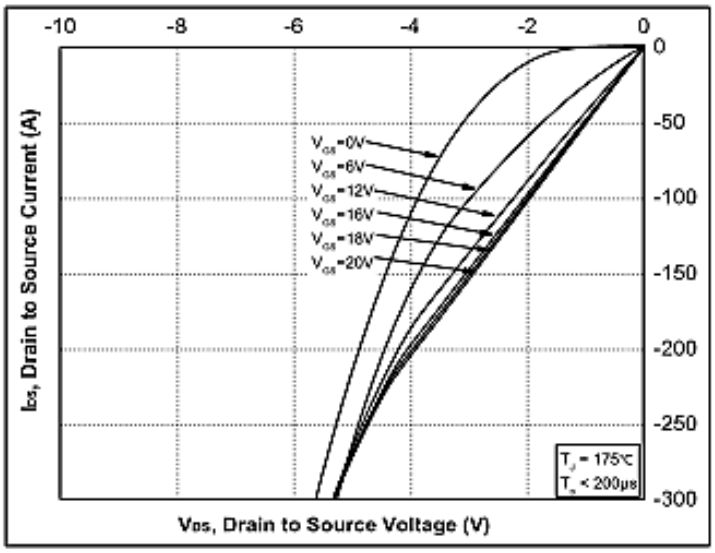


Figure 15. 3rd Quadrant Characteristic at 175°C

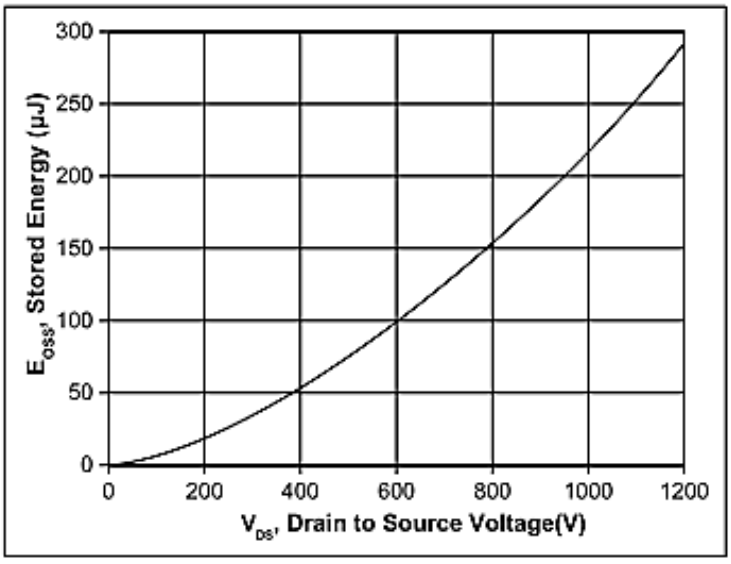


Figure 16. Output Capacitor Stored Energy

TYPICAL PERFORMANCE - For Reference Only

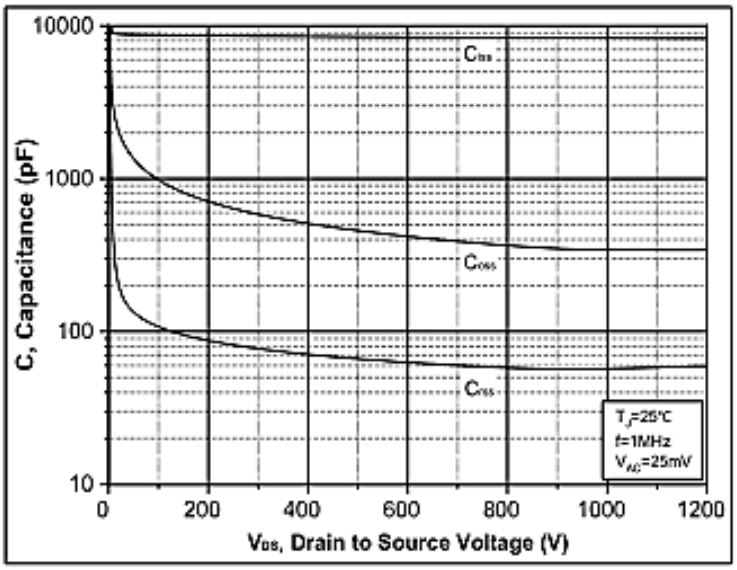


Figure 17. Capacitances vs. Drain-Source Voltage

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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