




SPECIFICATION SHEET NO.	S0115- NC1M120C12WDCU	
ORIGINAL MFG/PART NO.	NovuSem/NC1M120C12WD	
NEXTGEN PART CODE	NC1M120C12WDCU	Indicate This Code For RFQ/Order
DATE	Jan. 15, 2025	
REVISION	A1	Updated With Most Recent Data
DESCRIPTION AND MAIN PARAMETRICS	<p>Silicon Carbide (SiC) MOSFET, Wafer, NC1M Series, Topside Metallization NiPdAu (4μm) Drain-Source Voltage (V_{DS}): 1200V, Industrial Grade Continuous Drain Current (I_D) @25°C: 214A Drain-Source On-State Resistance R_{DS} (ON): 12mΩ Operating Temperature: -55°C ~ 175°C (T_J) Package in Wafer Case, REACH/RoHS/RoHS III Compliant</p>	
CUSTOMER		
CUSTOMER PART NUMBER		
CROSS REF. PART NUMBER		
MEMO		

VENDOR APPROVE			
Issued/Checked/Approved			
Effective Date: Jan. 15, 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)
- REACH/RoHS/RoHS III 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 NC1M120C12WDCU For RFQ and Order.

PART CODE GUIDE

RFQ
[Request For Quotation](#)

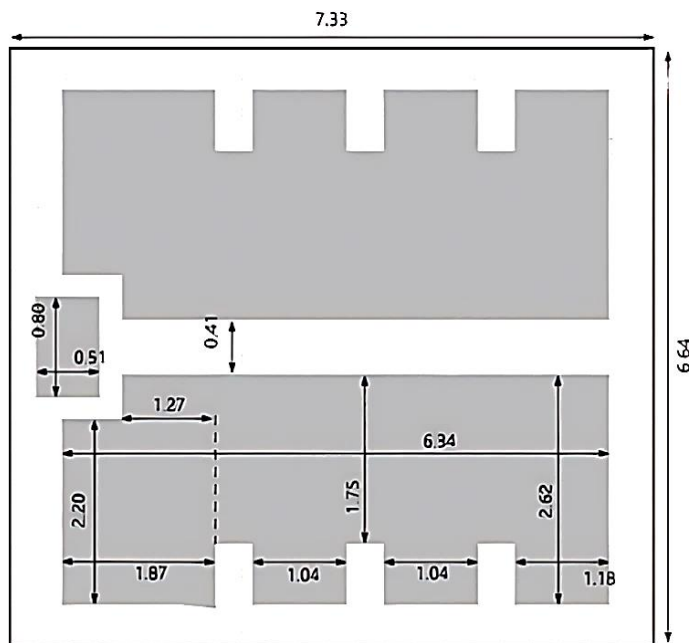
CODE	NAME	KEY SPECIFICATION OPTION
NC1M	Product Series Code	NC1D: Novusem Silicon Carbide (SiC) Schottky Diode Gen 1 Industrial Grade series code NC1M: NovuSem Silicon Carbide (SiC) MOSFET Gen 1 Industrial Grade series code
120	Drain-Source Voltage (Vds)	120: 1200V; 65: 650V
C	Material code	C: SiC; S: Silicon
12	Drain-Source On-State Resistance Rds(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
D	Internal Control Code	Letter A~Z, a~z or digits (0~9); Blank: N/A
C	Package Type	C: Wafer Case; T: Tube; R: Tape & Reel
U	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

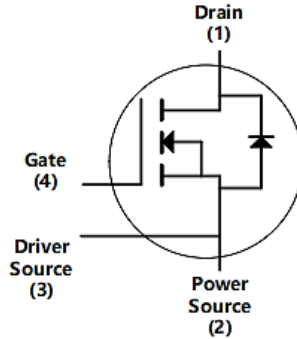
Wafer Size	6 inch
Topside Metallization	NiPdAu (4μm)
Backside Metallization	Ti (0.2μm)- Ni (0.3μm)- Ag (2μm)
Passivation	Polymide

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 @T_c=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 _{GSMMax}	Static	-8/+22	V
Continuous Drain Current	I _D	V _{GS} =20V, T _c =25°C	214	A
		V _{GS} =20V, T _c =100°C	151	
Pulsed Drain Current	I _D (pulse)	Pulse width t _p 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 R_{θJC} 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	VGS=0V ID=100µA	1200	-	-	V
Gates Threshold Voltage	V GS(th)	VDS=VGS, ID=40mA	2.0	2.7	3.5	V
		VDS=VGS, ID=40mA, Tj=175°C	-	1.9	-	
Zero Gate Voltage Drain Crurent	IDSS	VDS=1200V, VGS=0V	-	2	100	µA
Gates-Source Leakage Crurent	IGSS	VGS=20V, VDS=0V	-	10	100	nA
Drain-Source On-State Resistance	RDS (ON)	VGS=20V, ID=100A	-	12	20	mΩ
		VGS=20V, ID=100A, Tj=175°C	-	20	-	
		VGS=18V, ID=100A	-	13	25	
		VGS=18V, ID=100A, Tj=175°C	-	21	-	
Transconductance	gfs	VDS=20V, IDS=100A	-	60	-	S
		V DS=20V, I DS=100A, Tj=175°C	-	52	-	
Gate to Source Charge	Qgs	VDS=800V, VGS=-5V/20V, ID=100A	-	215	-	nC
Gate to Drain Charge	Qgd		-	179	-	
Total Gate Charge	Qg		-	577	-	
Input Capacitance	Ciss	VGS=0V, VDS=1000V f=1MHz VAC=25mV	-	8330	-	pF
Output Capacitance	Coss		-	343	-	
Reverse Transfer Capacitance	Crss		-	57	-	
Coss Stored Energy	Eoss		-	217	-	
Internal Gate Resistance	RG(int)	f=1MHz, VAC=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, T _j = 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

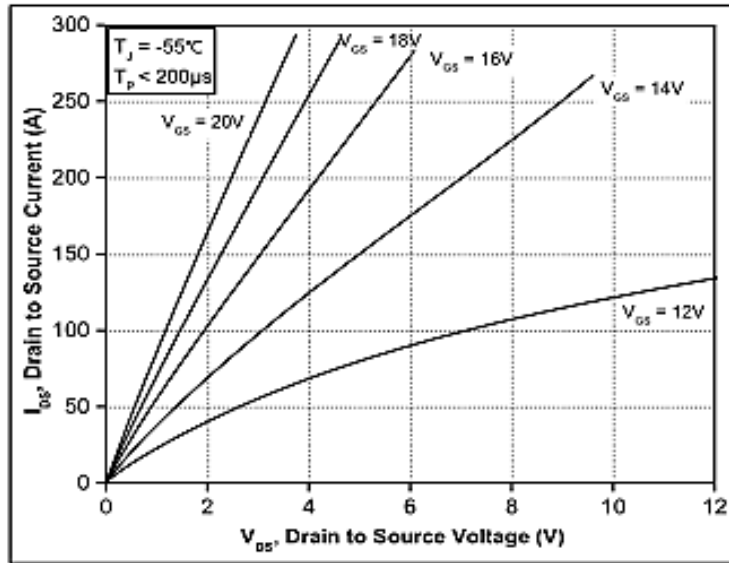


Figure 1. Output Characteristics $T_J = -55^\circ\text{C}$

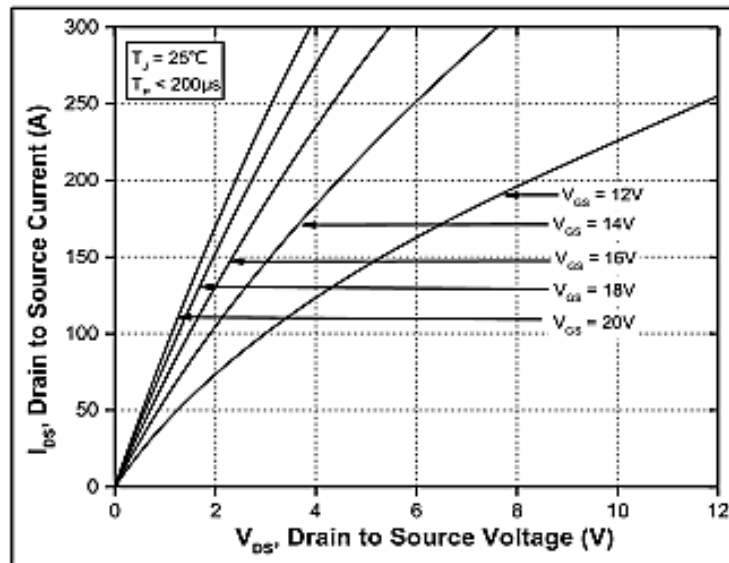


Figure 2. Output Characteristics $T_J = 25^\circ\text{C}$

TYPICAL PERFORMANCE - For Reference Only

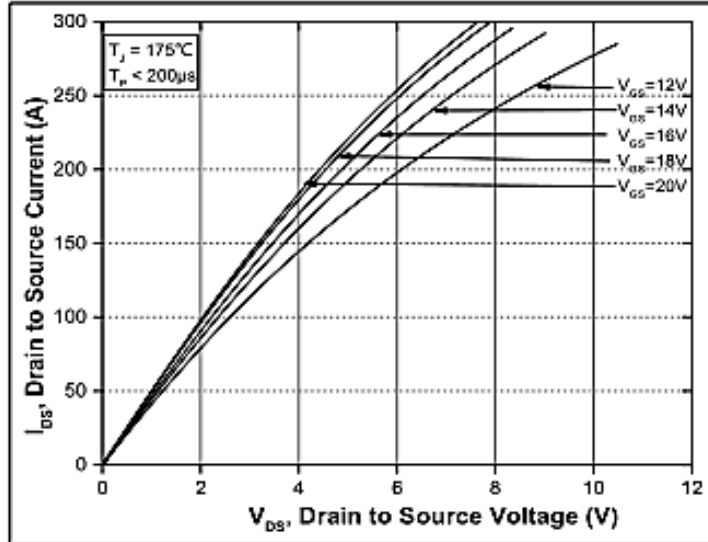


Figure 3. Output Characteristics $T_J=175^\circ\text{C}$

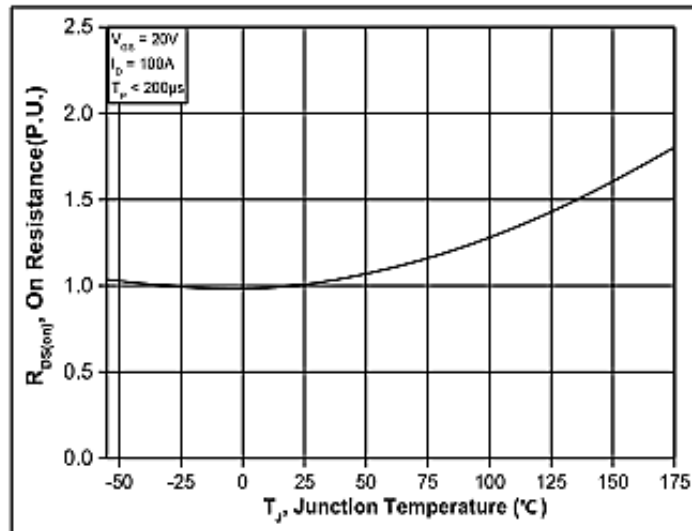


Figure 4. Normalized On-Resistance vs. Temperature

TYPICAL PERFORMANCE - For Reference Only

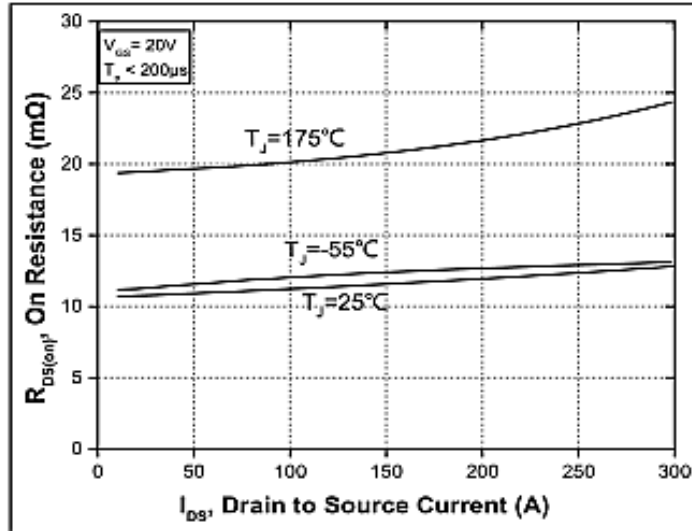


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

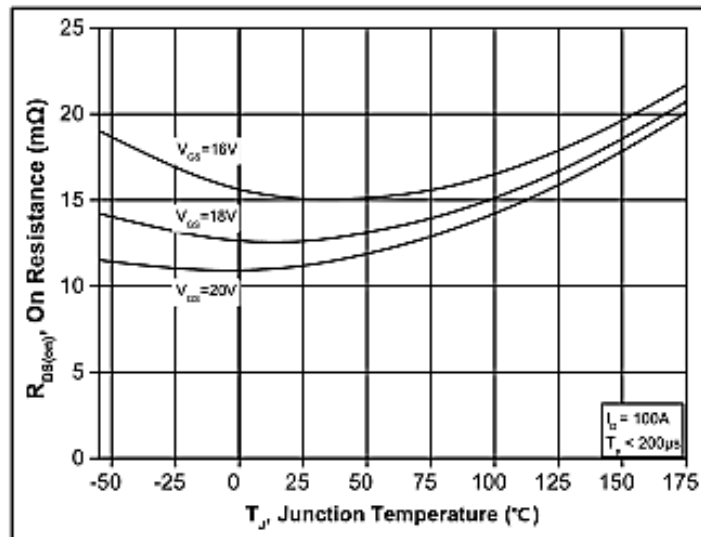


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

TYPICAL PERFORMANCE - For Reference Only

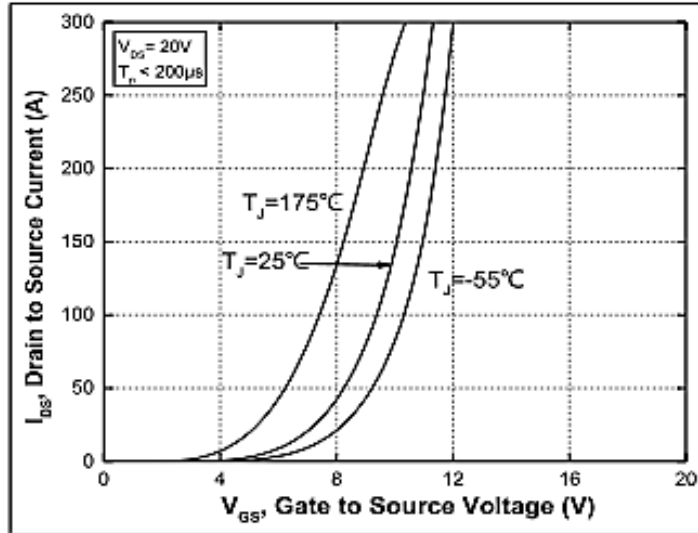


Figure 7. Transfer Characteristic for Various Junction Temperatures

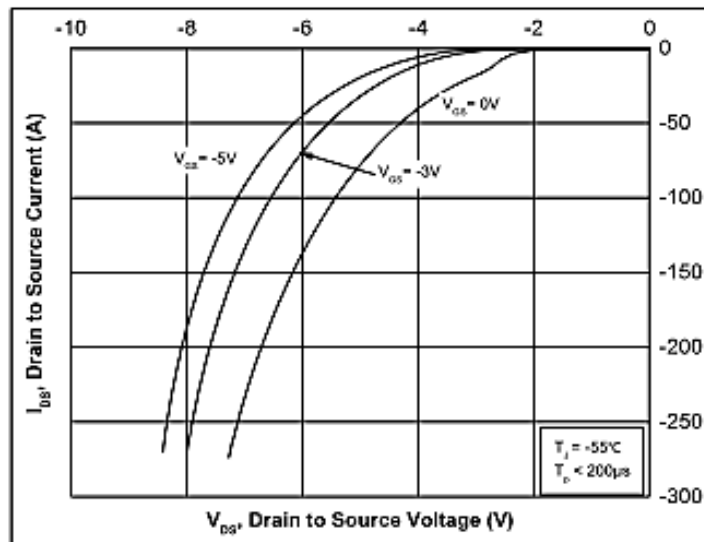


Figure 8. Body Diode Characteristic at -55°C

TYPICAL PERFORMANCE - For Reference Only

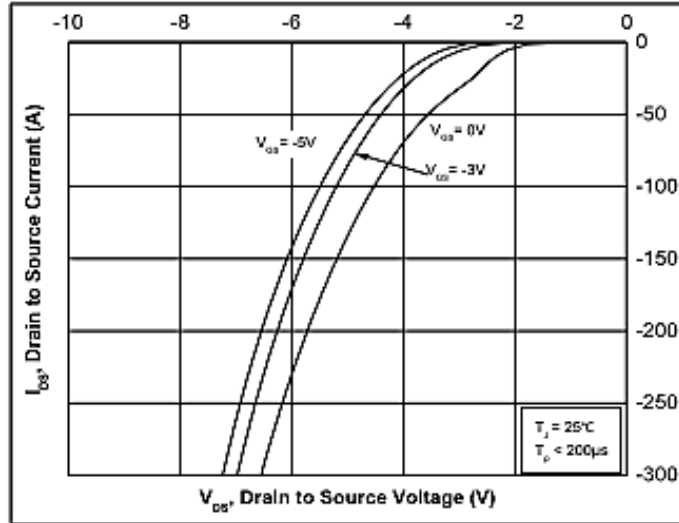


Figure 9. Body Diode Characteristic at 25°C

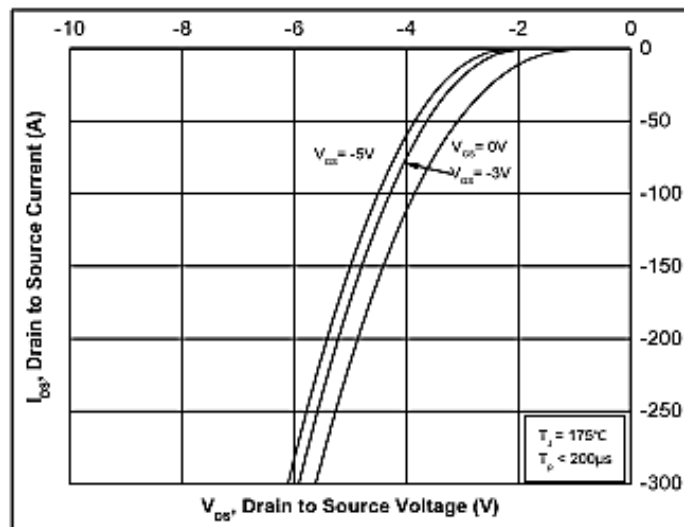


Figure 10. Body Diode Characteristic at 175°C

TYPICAL PERFORMANCE - For Reference Only

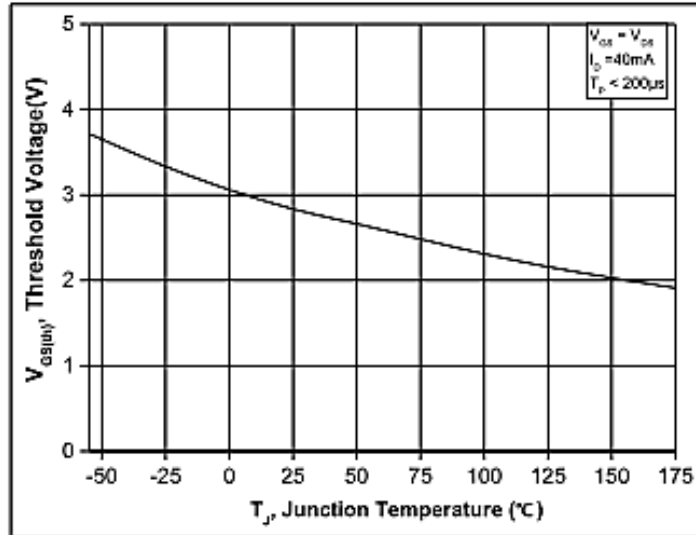


Figure 11. Threshold Voltage vs. Temperature

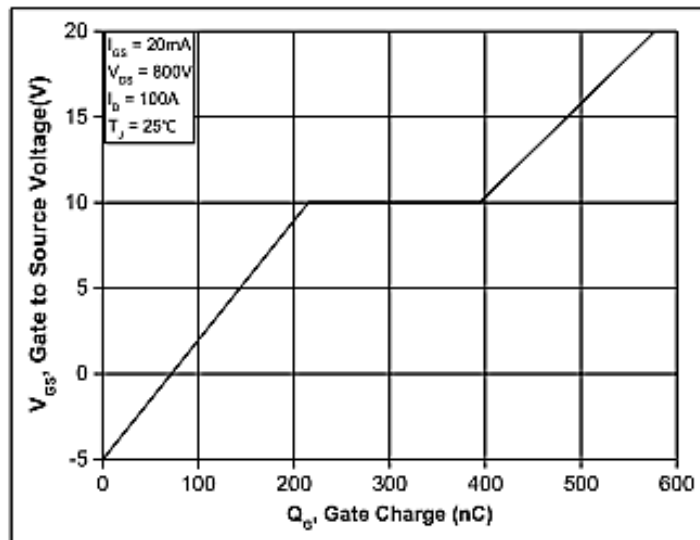


Figure 12. Gate Charge Characteristics

TYPICAL PERFORMANCE - For Reference Only

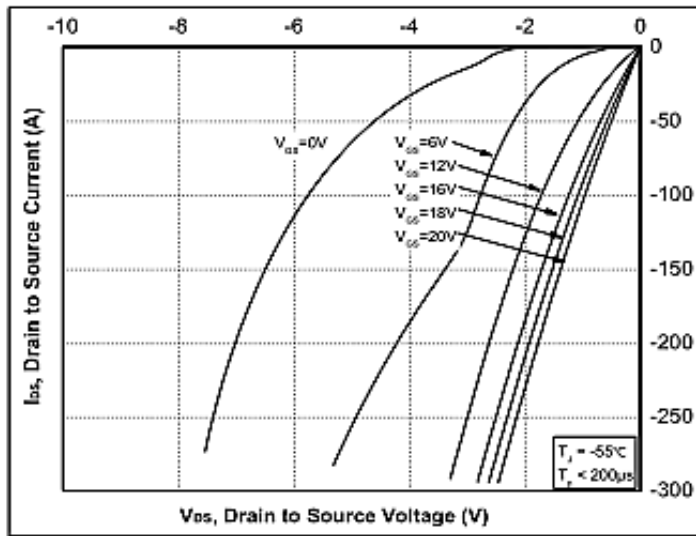


Figure 13. 3rd Quadrant Characteristic at -55°C

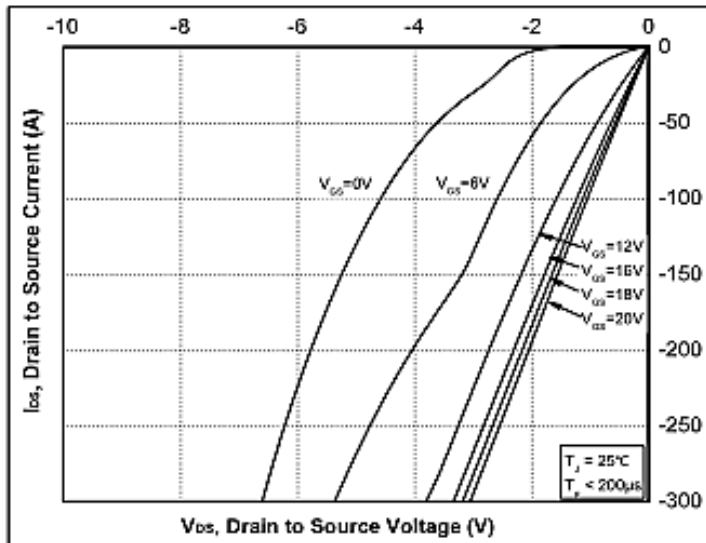


Figure 14. 3rd Quadrant Characteristic at 25°C

TYPICAL PERFORMANCE - For Reference Only

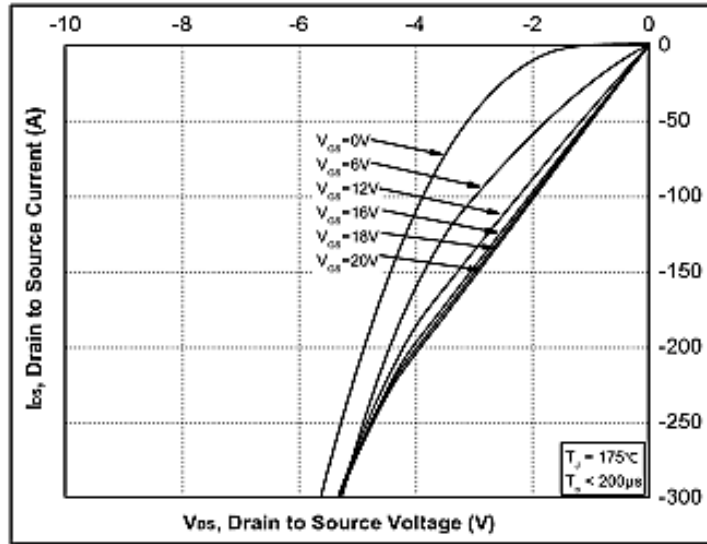


Figure 15. 3rd Quadrant Characteristic at 175°C

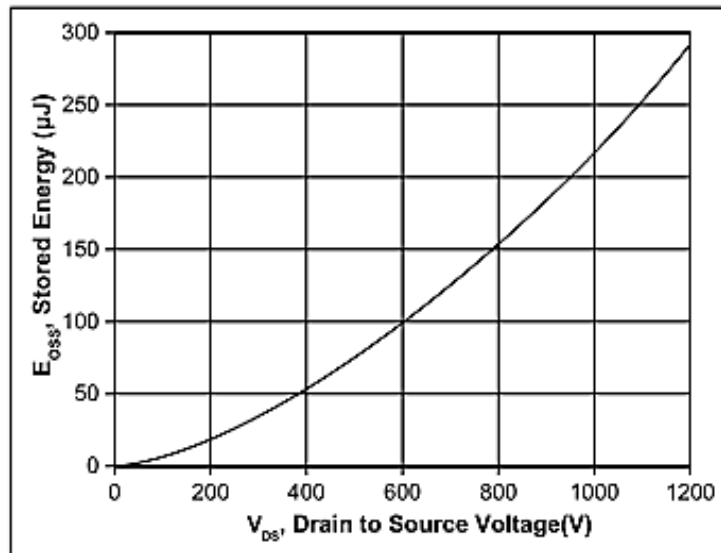


Figure 16. Output Capacitor Stored Energy

TYPICAL PERFORMANCE - For Reference Only

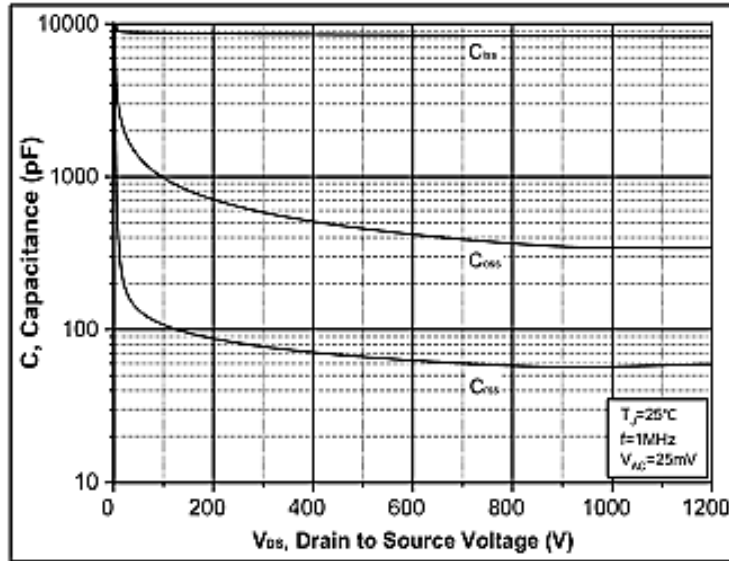


Figure 17. Capacitances vs. Drain-Source Voltage

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 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 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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