




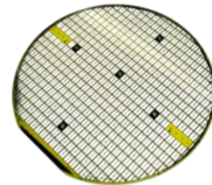
| | | |
|---|---|---|
| SPECIFICATION SHEET NO. | S0128- NC1M120C12WDCU | |
| ORIGINAL MFG/PART NO. | NovuSem/NC1M120C12WD | |
| NEXTGEN PART CODE | NC1M120C12WDCU | Indicate This Code For RFQ /Order |
| DATE | Jan. 28, 2025 | |
| REVISION | A3 | Updated With Most Recent Data |
| DESCRIPTION AND MAIN PARAMETRICS | <p>Silicon Carbide (SiC) MOSFET, 6 Inch 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 (TJ) Package in Sawn Wafer on Blue Tape, REACH/RoHS/RoHS III Compliant</p> | |
| CUSTOMER | | |
| CUSTOMER PART NUMBER | | |
| CROSS REF. PART NUMBER | | |
| MEMO | | |

| |
|---|
| VENDOR APPROVE |
| <div> <div>Issued/Checked/Approved</div> <div>    </div> </div> |
| Effective Date: Jan. 28, 2025 |

| |
|--------------------------------------|
| CUSTOMER APPROVE |
| <div> <div></div> <div></div> </div> |
| 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
- Topside Metallization NiPdAu (4μm)
- 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 NC1M120C12WDCU For RFQ and Order.

PART CODE GUIDE

RFQ

[Request For Quotation](#)

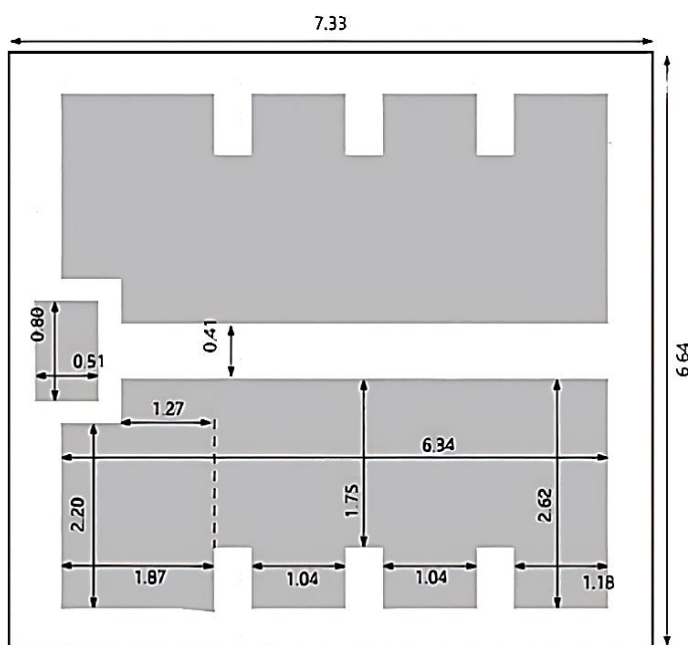
| CODE | NAME | KEY SPECIFICATION OPTION |
|------|---|--|
| NC1M | Product Series Code | NC1D: Novusem Silicon Carbide (SiC) Schottky Diode Gen 1 Industrial Grade series code NC1M: NovuSem Silicon Carbide (SiC) MOSFET Gen 1 Industrial Grade series code |
| 120 | Drain-Source Voltage (V _{DS}) | 120: 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 |
| D | Internal Control Code | D: Letter or digits (A~Z, a~z or 1~9) for Special Parametric; Blank: N/A |
| C | Package Type | C: Wafer Case; T: Tube; R: Sawn Wafer on Blue Tape |
| U | Special/Custom Parameters Code | U: 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 |

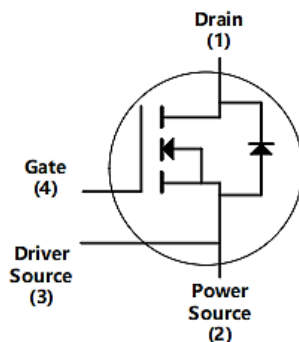
| | |
|------------------------|----------------------------------|
| Wafer Size | 6 inch |
| Topside Metallization | NiPdAu (4μm)) |
| Backside Metallization | Ti (0.2μm)- Ni (0.3μm)- Ag (2μm) |
| Passivation | Polymide |

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 _{GSM} | 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 _j Max. | 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

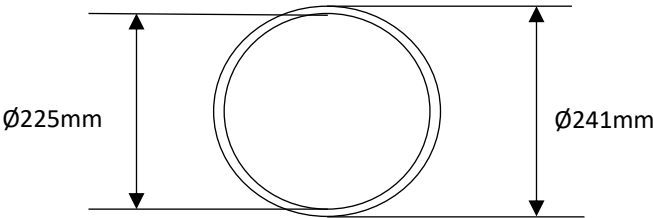
ELECTRICAL CHARACTERISTICS @Tc=25 °C (Unless Otherwise Specified)

| PARAMETER | SYMBOL | CONDITIONS | VALUE | | | UNIT |
|-------------------------------------|------------|---|-------|------|------|------|
| | | | Min. | Typ. | Max. | |
| Drain-Source Breakdown Voltage | V (BR) DSS | 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 | - | μJ |
| 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 |

BLUE TAPE - Unit: mm, 10 Inch Snap Ring, Image shown is for reference only



TYPICAL PERFORMANCE - For Reference Only

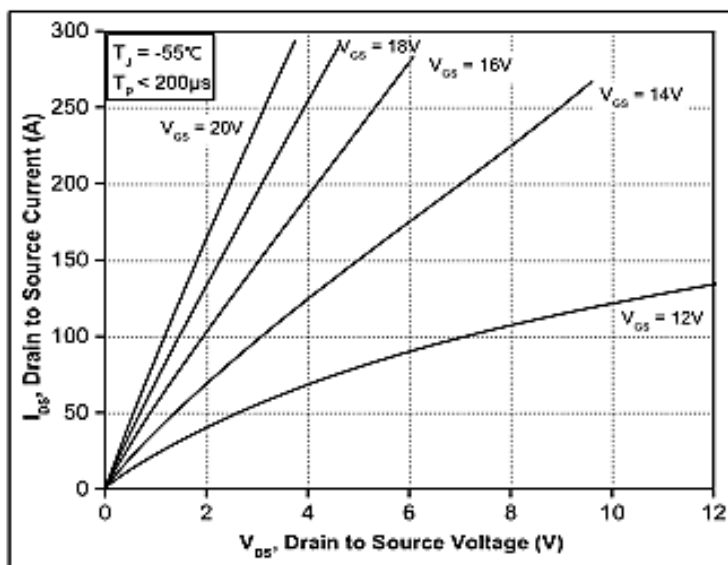


Figure 1. Output Characteristics $T_J = -55^\circ\text{C}$

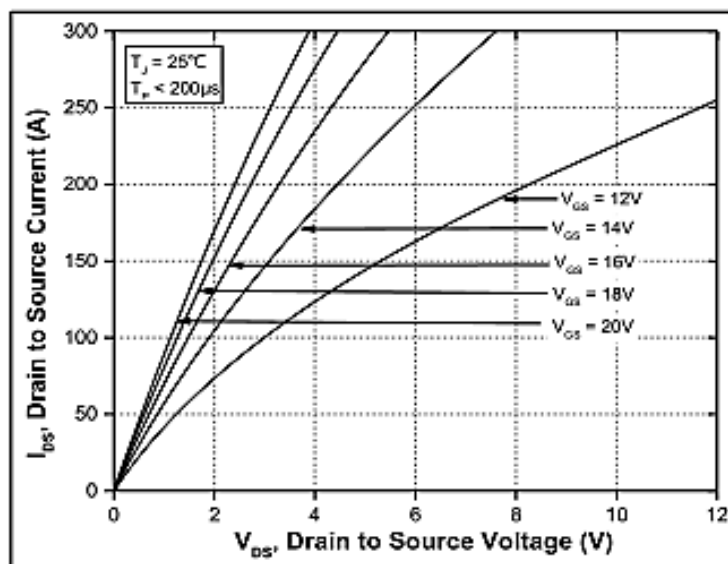


Figure 2. Output Characteristics $T_J = 25^\circ\text{C}$

TYPICAL PERFORMANCE - For Reference Only

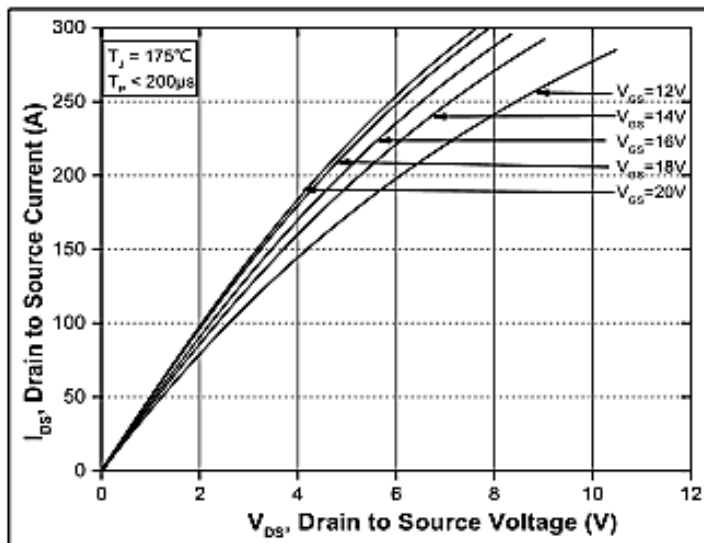


Figure 3. Output Characteristics $T_J=175^\circ\text{C}$

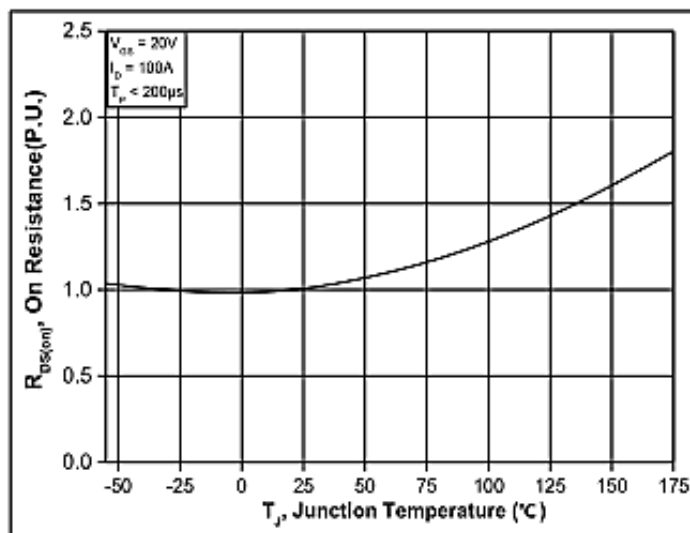


Figure 4. Normalized On-Resistance vs. Temperature

TYPICAL PERFORMANCE - For Reference Only

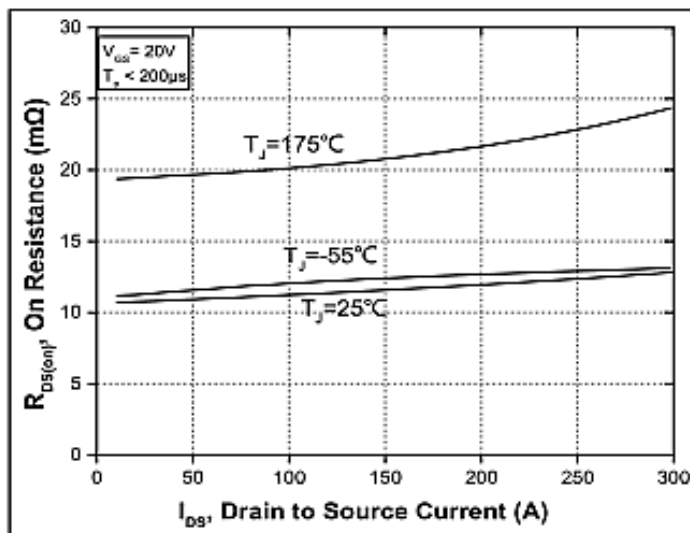


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

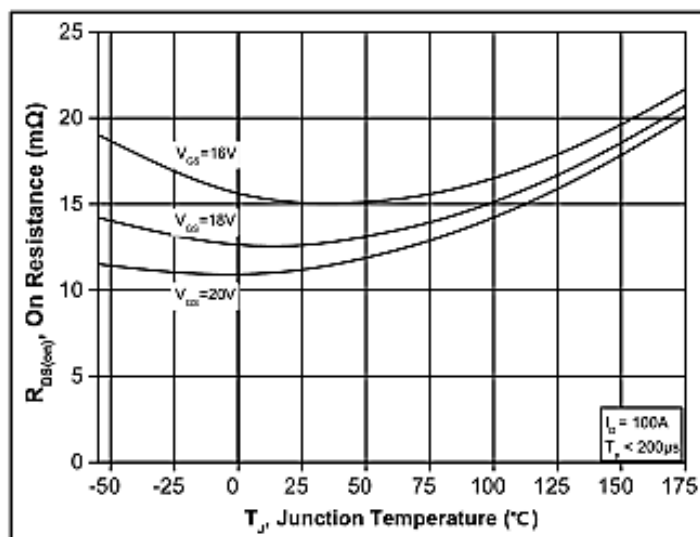


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

TYPICAL PERFORMANCE - For Reference Only

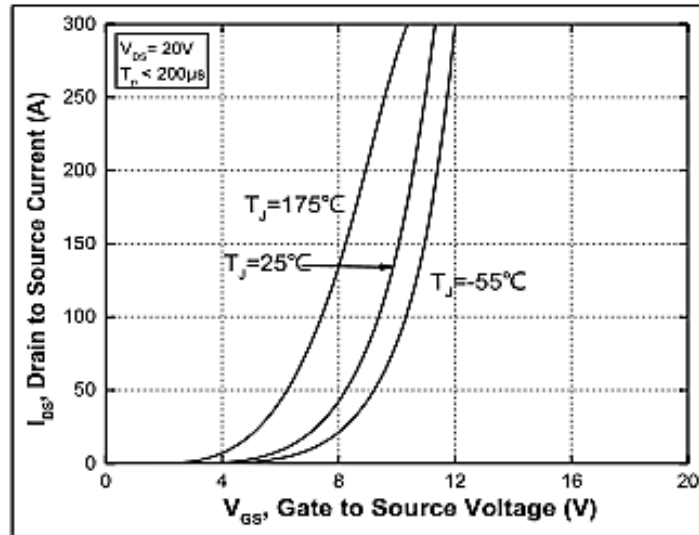


Figure 7. Transfer Characteristic for Various Junction Temperatures

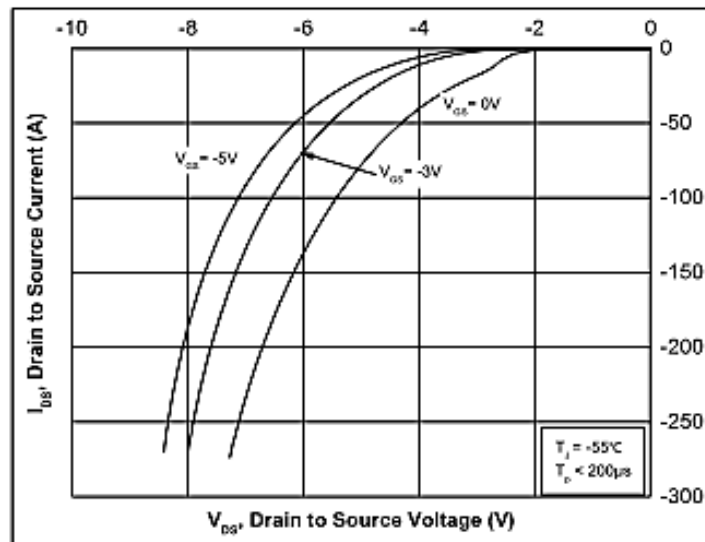


Figure 8. Body Diode Characteristic at -55°C

TYPICAL PERFORMANCE - For Reference Only

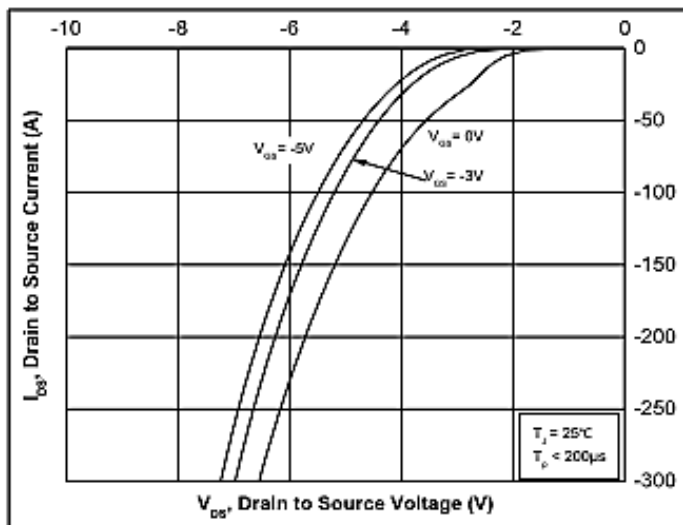


Figure 9. Body Diode Characteristic at 25°C

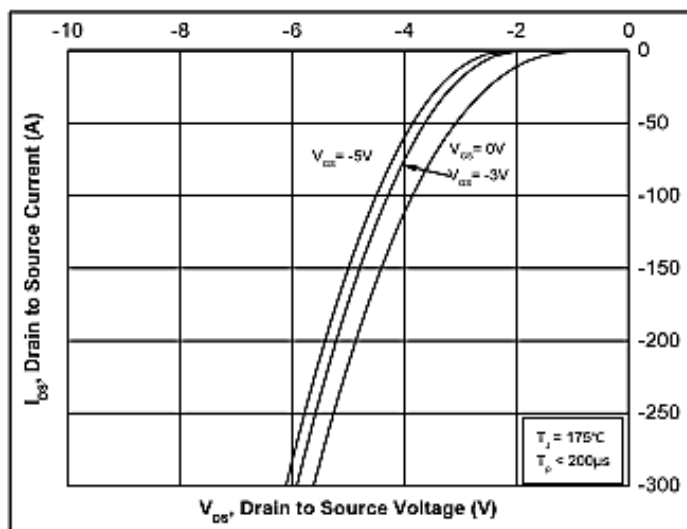


Figure 10. Body Diode Characteristic at 175°C

TYPICAL PERFORMANCE - For Reference Only

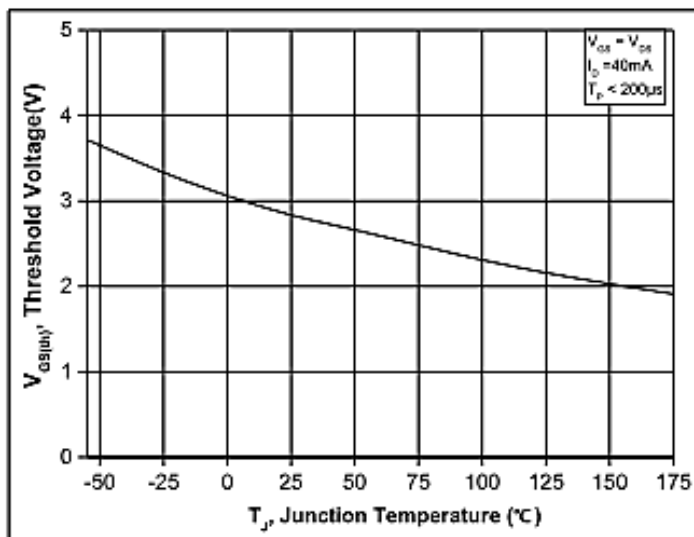


Figure 11. Threshold Voltage vs. Temperature

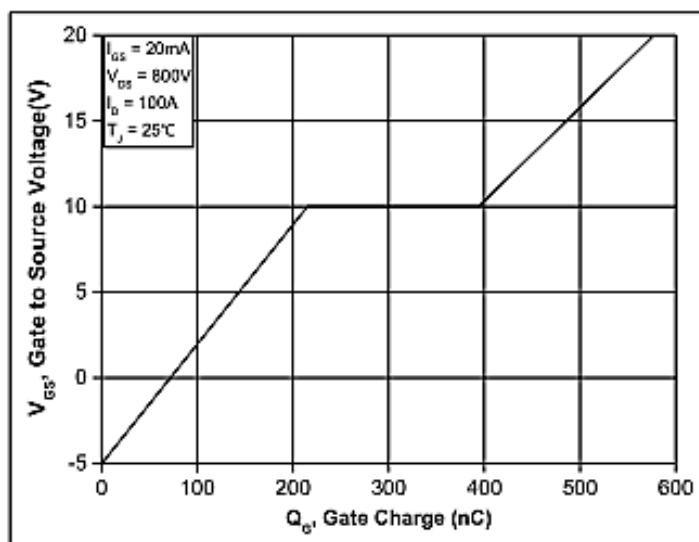


Figure 12. Gate Charge Characteristics

TYPICAL PERFORMANCE - For Reference Only

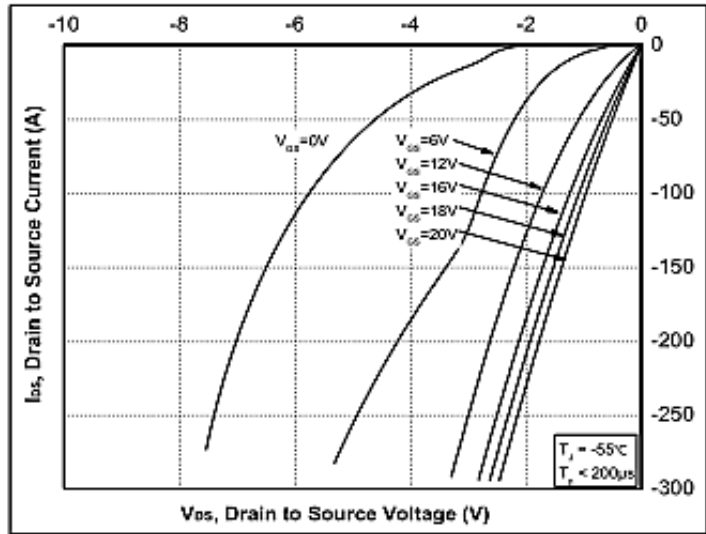


Figure 13. 3rd Quadrant Characteristic at -55°C

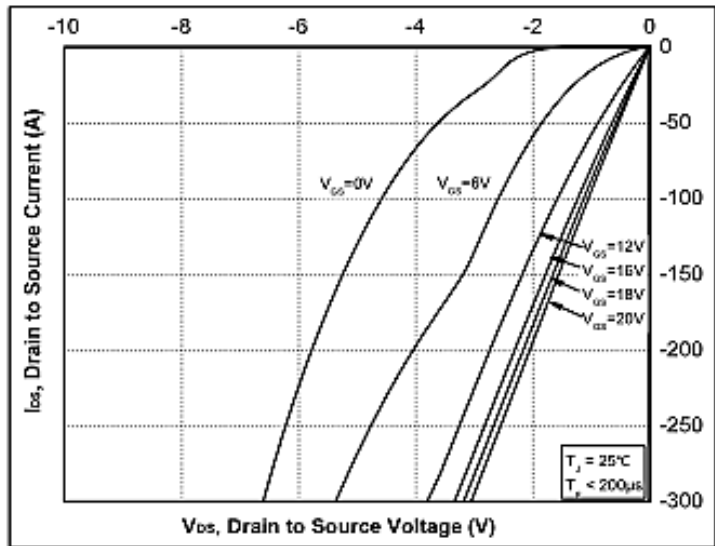


Figure 14. 3rd Quadrant Characteristic at 25°C

TYPICAL PERFORMANCE - For Reference Only

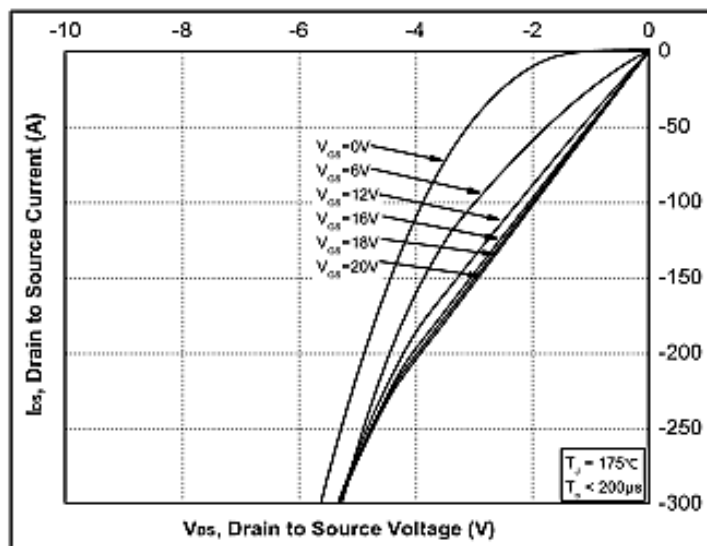


Figure 15. 3rd Quadrant Characteristic at 175°C

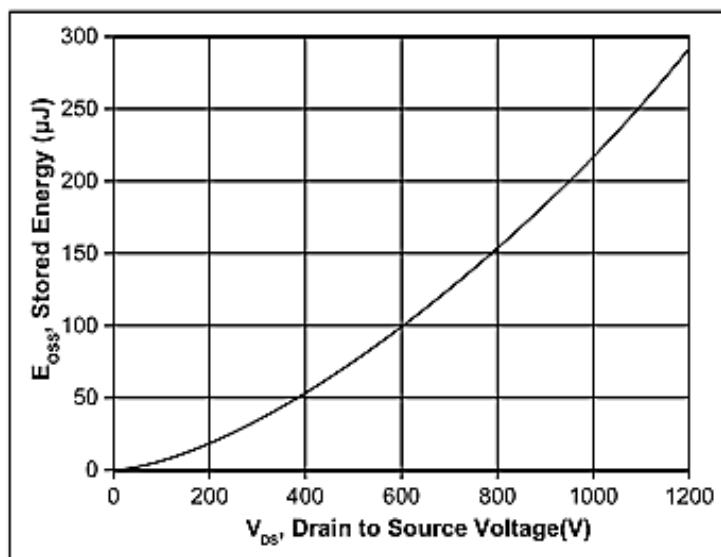


Figure 16. Output Capacitor Stored Energy

TYPICAL PERFORMANCE - For Reference Only

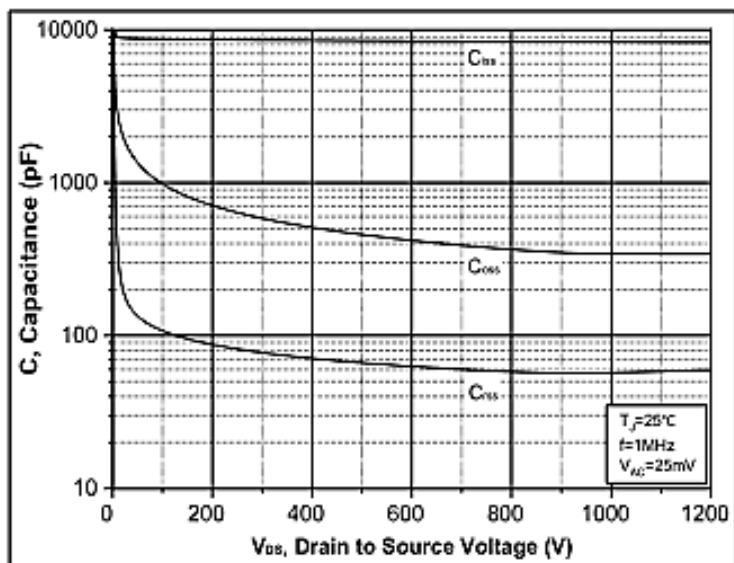


Figure 17. Capacitances vs. Drain-Source Voltage

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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