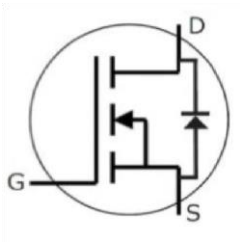
# CPM4-0120-0149JS0A

## Wolfspeed SiC Gen 4 MOSFET


Package Types: Bare Die
PN's: CPM4-0120-0149JS0A

### Description

This is the Wolfspeed's 4th generation of high performance silicon carbide MOSFET in a packageless bare die format to be implemented into any custom module design. The high blocking voltage with low on-resistance, high speed switching with low capacitance make this MOSFET ideal for high frequency switching application including solar inverters and EV chargers.

### Features

- Enhanced 4th Generation SiC MOSFET
- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- Fast intrinsic diode with low reverse recovery

### Applications

- EV Chargers
- Server & Telecom PSU
- UPS
- Solar Inverters
- SMPS
- DC/DC Converters

### Absolute Maximum Ratings

Stress beyond those listed under absolute maximum ratings may damage the device.

| Parameter | Symbol | | Rating | Unit |
|---|---|---|---|---|
| Drain-Source Voltage, across Tvj | VDS(max) | | 1200 | V |
| Maximum Gate-Source Voltage, Peak Transient Capability | VGS(max) | | -8/+19 | V |
| Continuous Drain Current, VGS = 15V, assumes die packaged in TO-247 package with Rth(j−c) < 0.63 K/W | ID | Tc = 25°C | 90 | A |
| | | Tc = 100°C | 67 | |
| Pulsed Drain Current, tp limited by Tvj(max) | ID(pulse) | | 152 | A |
| Virtual Junction and Storage Temperature | TVJ, Tstg | | -55 to +175 | °C |
| Maximum Processing Temperature, in non-reactive ambient | Tproc | | 325 | °C |

### Recommended Operating Conditions

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Recommended Operating Gate - Source Voltage | $V_{GS(op)}$ | -4/+15 | V |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## Electrical Characteristics ($T_{VJ}$ = 25˚C)

| Characteristics | Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | 1200 | | | V | $V_{GS}$ = 0 V, $I_D$ =100 µA |
| Gate Threshold Voltage | $V_{GS(th)}$ | 1.8 | 2.7 | 3.6 | V | $V_{DS}$ = $V_{GS}$, $I_{DS}$ = 10.7 mA |
| | | | 2.2 | | V | $V_{DS}$ = $V_{GS}$, $I_{DS}$ = 10.7 mA, $T_{VJ}$ = 175°C |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | | 1 | 50 | µA | $V_{DS}$ = 1200 V, $V_{GS}$ = 0 V |
| Gate-Source Leakage Current | $I_{GSS}$ | | 10 | 250 | nA | $V_{GS}$ = 15 V, $V_{DS}$ = 0 V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | 18.2 | 26 | 33.8 | mΩ | $V_{GS}$ = 15 V, $I_D$ = 38 A |
| | | | 49 | | | $V_{GS}$ = 15 V, $I_D$ = 38 A, $T_{VJ}$ = 175°C |
| Transconductance | $g_{fs}$ | | 33 | | S | $V_{DS}$ = 20 V, $I_{DS}$ = 38 A |
| | | | 33 | | | $V_{DS}$ = 20 V, $I_{DS}$ = 38 A, $T_{VJ}$ = 175°C |
| Input Capacitance | $C_{iss}$ | | 3470 | | pF | $V_{GS}$ = 0 V, $V_{DS}$ = 1000 V<br>f = 100 kHz<br>$V_{AC}$ = 25 mV |
| Output Capacitance | $C_{oss}$ | | 110 | | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | 9 | | | |
| $C_{oss}$ Stored Energy | $E_{oss}$ | | 68 | | µJ | $V_{DS}$ = 1000 V, f = 100 kHz |
| Internal Gate Resistance | $R_{G(int)}$ | | 4.1 | | Ω | f = 1 kHz, $V_{AC}$ = 25 mV |
| Gate to Source Charge | $Q_{gs}$ | | 35 | | nC | $V_{DS}$ = 800 V, $V_{GS}$ = -4 V/15 V<br>$I_{DS}$ = 38 A<br>Per IEC60747-8-4 pg 21 |
| Gate to Drain Charge | $Q_{gd}$ | | 38 | | | |
| Total Gate Charge | $Q_g$ | | 136 | | | |

## Reverse Diode Characteristics ($T_{VJ}$ = 25˚C)

| Characteristics | Symbol | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|
| Diode Forward Voltage | $V_{SD}$ | 4.8 | | V | $V_{GS}$ = -4 V, $I_{SD}$ = 19.5 A |
| | | 4.3 | | V | $V_{GS}$ = -4 V, $I_{SD}$ = 19.5 A, $T_{VJ}$ = 175 °C |
| Reverse Recovery Time | $t_{rr}$ | 56 | | ns | $V_{GS}$ = -4 V, $I_{SD}$ = 38 A, $V_R$ = 800 V<br>dif/dt = 4750 A/µs, $T_{VJ}$ = 175 °C |
| Reverse Recovery Charge | $Q_{rr}$ | 590 | | nC | |
| Peak Reverse Recovery Current | $I_{rrm}$ | 34 | | A | |

## Typical Performance

All the graphs are based on a die placed in a TO-247-4L package.

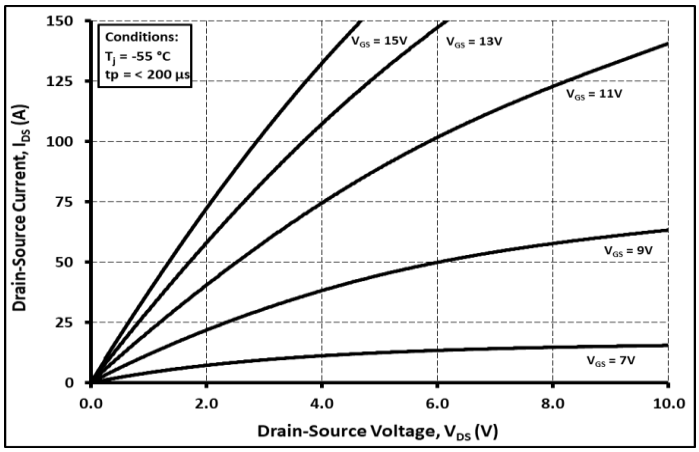


**Figure 1.**

Output Characteristics $T_{vj}$ = -55 °C

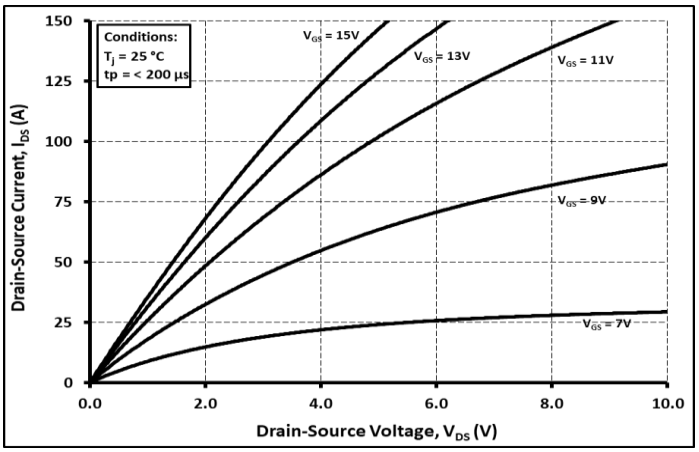


**Figure 2.**

Output Characteristics $T_{vj}$ = 25 °C

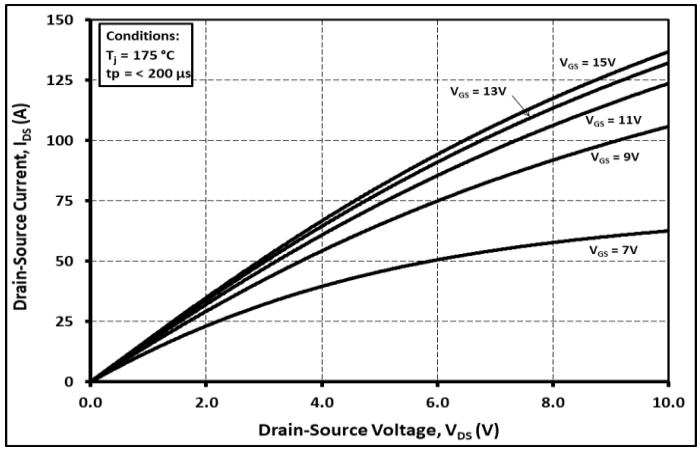


**Figure 3.**

Output Characteristics $T_{vj}$ = 175 °C

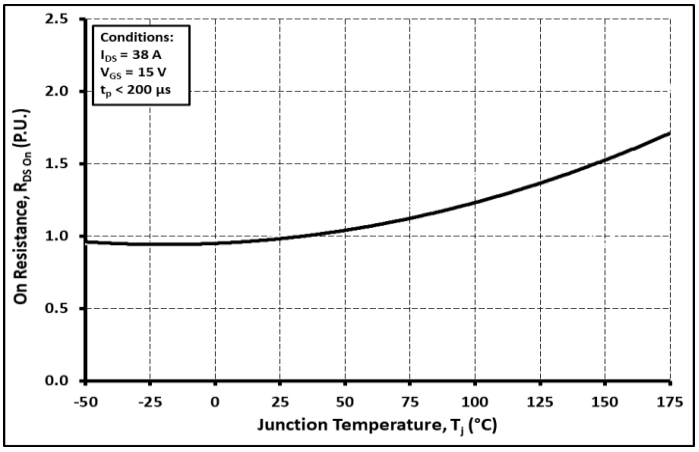


**Figure 4.**

Normalized On-Resistance vs. Temperature

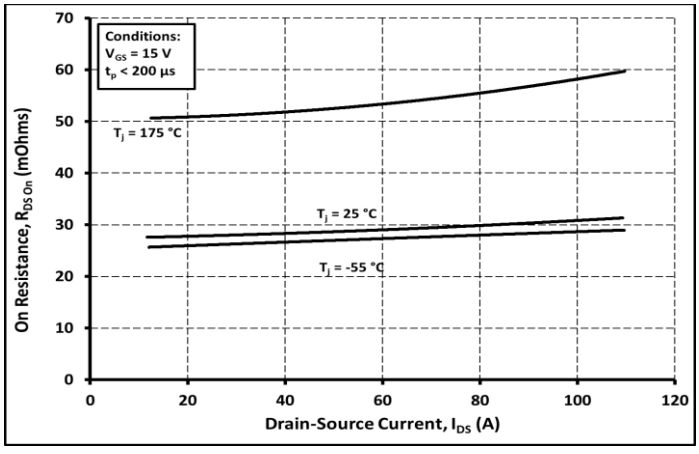


**Figure 5.**

On-Resistance vs. Drain Current For Various Temperatures

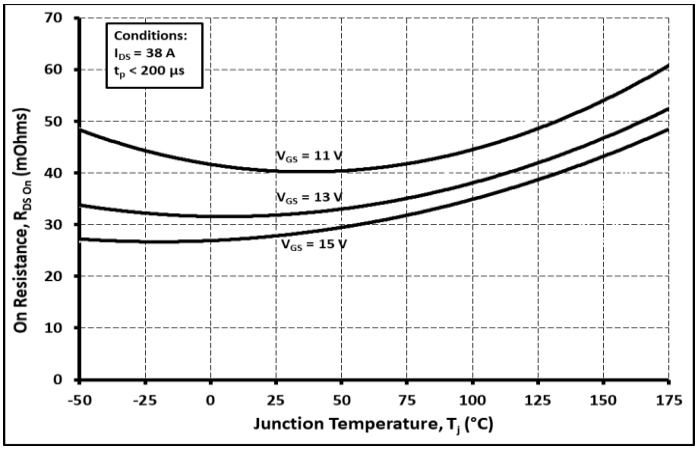


**Figure 6.**

On-Resistance vs. Temperature For Various Gate Voltages

## Typical Performance

All the graphs are based on a die placed in a TO-247-4L package.

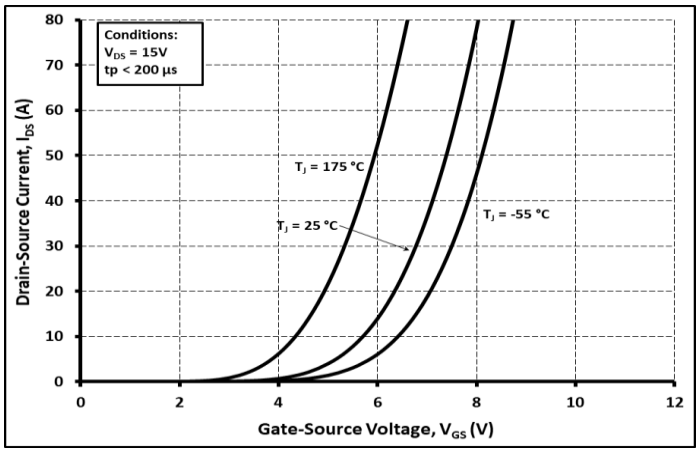


**Figure 7.**

Transfer Characteristic For Various Junction Temperatures

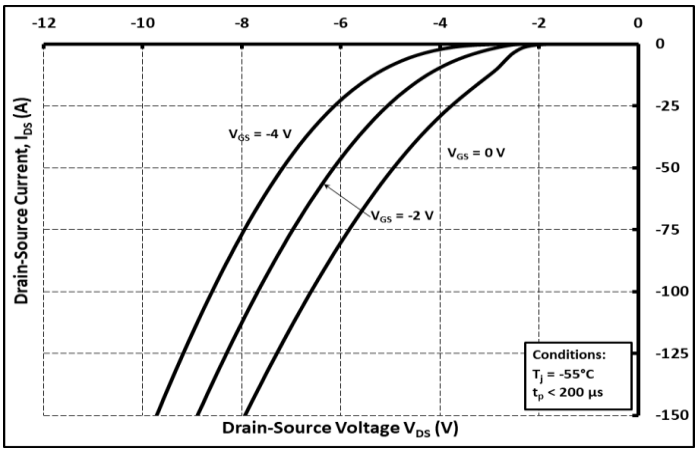


**Figure 8.**

Body Diode Characteristic at $T_{vj}$ = -55 °C

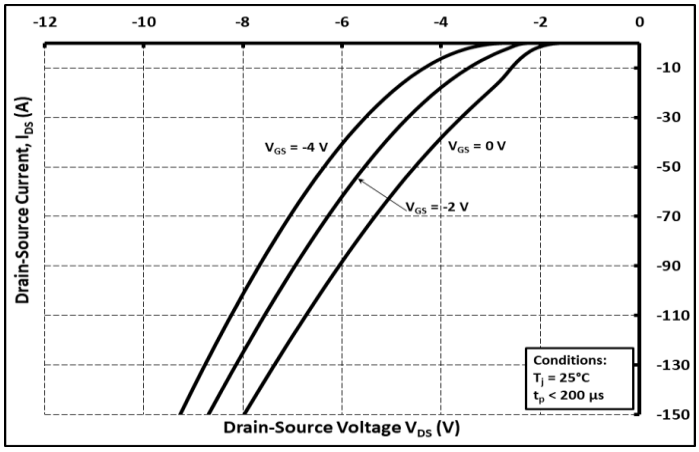


**Figure 9.**

Body Diode Characteristic at $T_{vj}$ = 25 °C

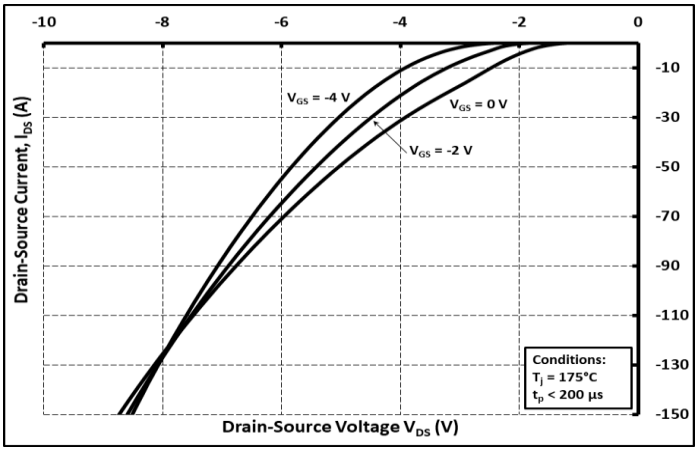


**Figure 10.**

Body Diode Characteristic at $T_{vj}$ = 175 °C

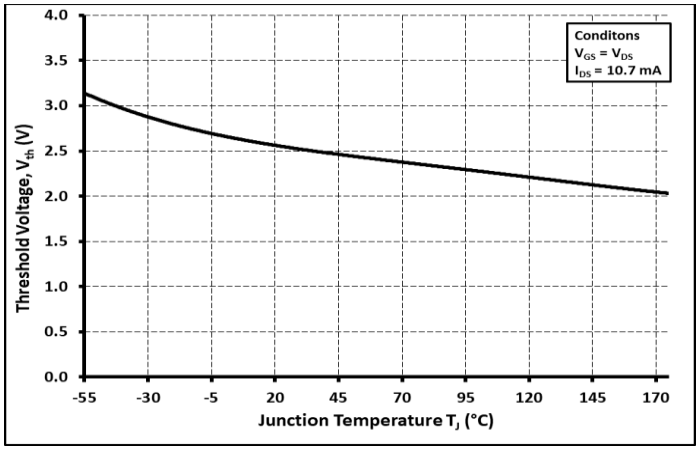


**Figure 11.**

Threshold Voltage vs. Temperature

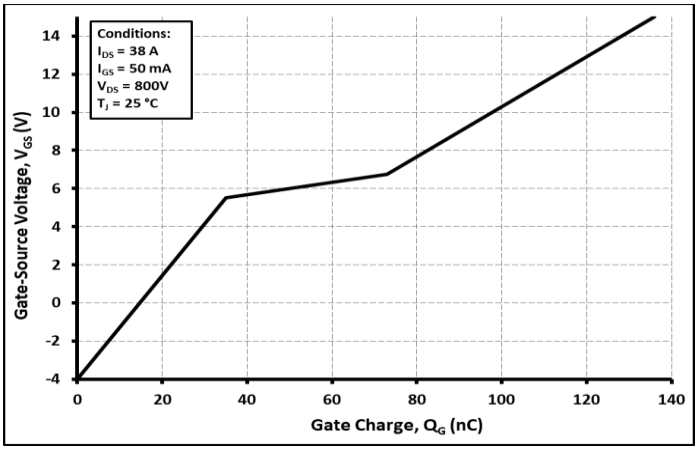


**Figure 12.**

Gate Charge Characteristics

## Typical Performance

All the graphs are based on a die placed in a TO-247-4L package.

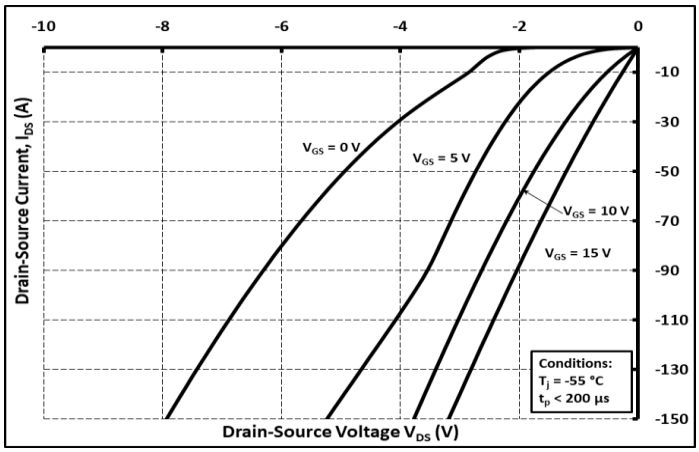


**Figure 13.**

3rd Quadrant Characteristic at $T_{vj}$ = -55 °C

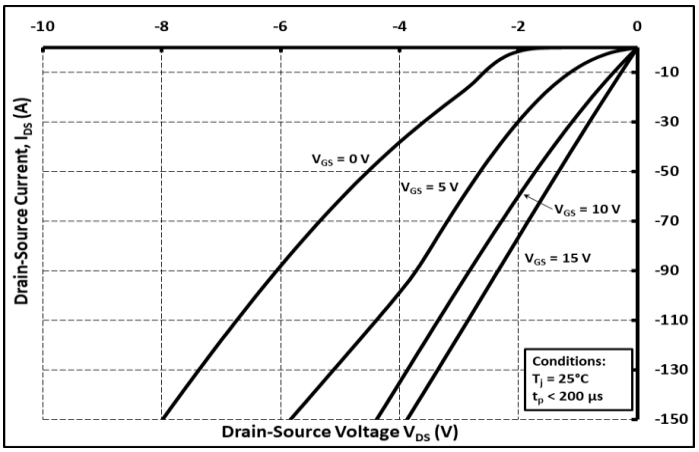


**Figure 14.**

3rd Quadrant Characteristic at $T_{vj}$ = 25 °C

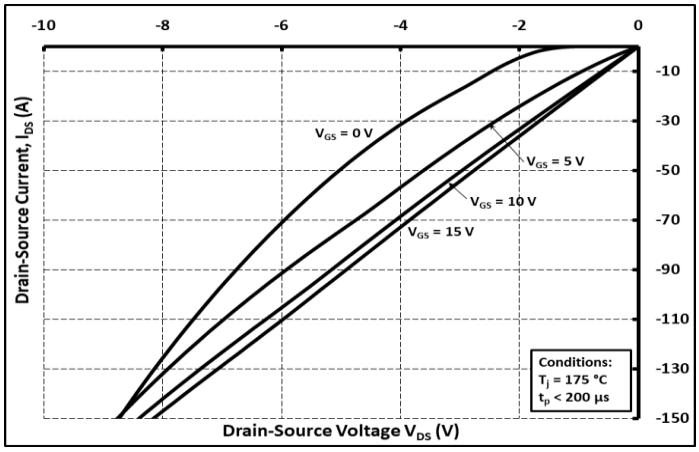


**Figure 15.**

3rd Quadrant Characteristic at $T_{vj}$ = 175 °C

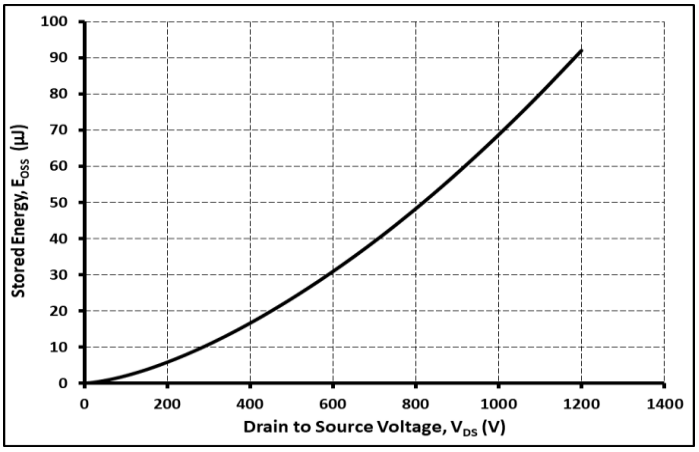


**Figure 16.**

Output Capacitor Stored Energy

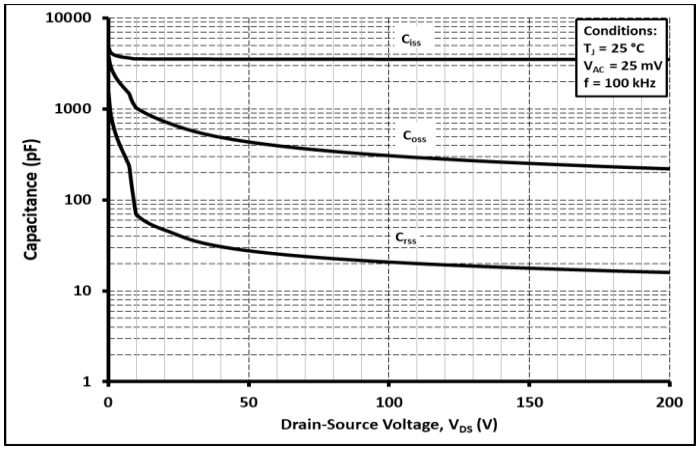


**Figure 17.**

Capacitances vs. Drain-Source Voltage (0-200V)

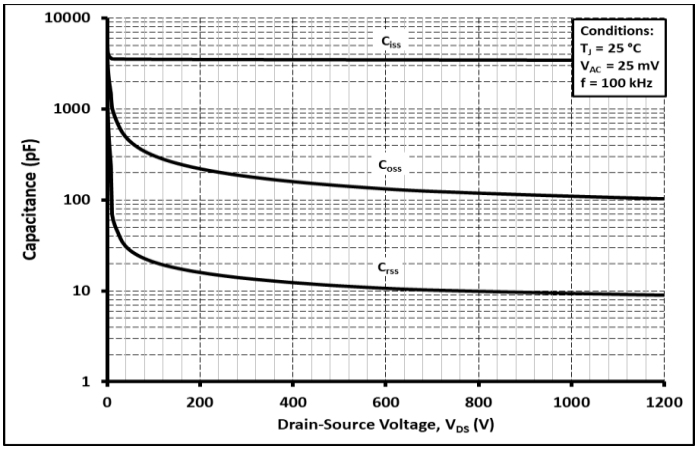


**Figure 18.**

Capacitances vs. Drain-Source Voltage (0-1200V)

## Product Ordering Information

| Order Number | Description | Package |
|---|---|---|
| CPM4-0120-0149JS0A-FY6 | SiC MOSFET G4 IND 1200V/26mO UV MLT | Bare Die Product |

## Revision History

| Revision History | Date of Change | Brief Summary |
|---|---|---|
| 3 | 1/1/2024 | Final Datasheet Release |

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