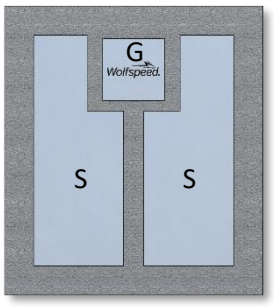
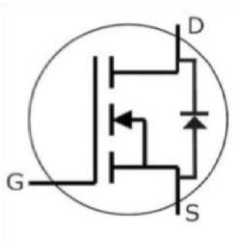
# CPM3-1200-0075A

## Wolfspeed SiC Gen 3 MOSFET




Package Types: Bare Die
PN's: CPM3-1200-0075A

### Description

This is the Wolfspeed's 3rd 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 renewable energy and switch mode power supplies

### Features

- Enhanced 3rd 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
- 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 $T_{vj}$ | $V_{DS(max)}$ | | 1200 | V |
| Maximum Gate-Source Voltage, Peak Transient Capability | $V_{GS(max)}$ | | -8/+19 | V |
| Continuous Drain Current, $V_{GS}$ = 15V, assumes die packaged in TO-247 package with $R_{th(j-c)}$ < 0.48 K/W | $I_D$ | $T_c$ = 25°C | 30 | A |
| | | $T_c$ = 100°C | 19.7 | |
| Pulsed Drain Current, $t_p$ limited by $T_{vj(max)}$ | $I_{D(pulse)}$ | | 80 | A |
| Virtual Junction and Storage Temperature | $T_{VJ}$, $T_{stg}$ | | -55 to +175 | °C |
| Maximum Processing Temperature, in non-reactive ambient | $T_{proc}$ | | 325 | °C |

### Recommended Operating Conditions

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Recommended Operating Gate - Source Voltage | $V_{GS(op)}$ | -4/+15 | V |

## 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 | 2.5 | 3.6 | V | $V_{DS}$ = $V_{GS}$, $I_{DS}$ = 4.9 mA |
| | | | 2.2 | | V | $V_{DS}$ = $V_{GS}$, $I_{DS}$ = 4.9 mA, $T_{VJ}$ = 175°C |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | | 1 | 8 | µA | $V_{DS}$ = 1200 V, $V_{GS}$ = 0 V |
| Gate-Source Leakage Current | $I_{GSS}$ | | 10 | 100 | nA | $V_{GS}$ = 15 V, $V_{DS}$ = 0 V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | | 75 | 90 | mΩ | $V_{GS}$ = 15 V, $I_D$ = 17.9 A |
| | | | 122 | | | $V_{GS}$ = 15 V, $I_D$ = 17.9 A, $T_{VJ}$ = 175°C |
| Transconductance | $g_{fs}$ | | 13 | | S | $V_{DS}$ = 20 V, $I_{DS}$ = 17.9 A |
| | | | 12.6 | | | $V_{DS}$ = 20 V, $I_{DS}$ = 17.9 A, $T_{VJ}$ = 175°C |
| Input Capacitance | $C_{iss}$ | | 1390 | | pF | $V_{GS}$ = 0 V, $V_{DS}$ = 1000 V<br>f = 1 Mhz<br>$V_{AC}$ = 25 mV |
| Output Capacitance | $C_{oss}$ | | 58 | | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | 2 | | | |
| $C_{oss}$ Stored Energy | $E_{oss}$ | | 33 | | µJ | $V_{DS}$ = 1000 V, f = 1 Mhz |
| Internal Gate Resistance | $R_{G(int)}$ | | 9 | | Ω | f = 1 Mhz, $V_{AC}$ = 25 mV |
| Gate to Source Charge | $Q_{gs}$ | | 18 | | nC | $V_{DS}$ = 800 V, $V_{GS}$ = -4 V/15 V<br>$I_{DS}$ = 17.9 A<br>Per IEC60747-8-4 pg 21 |
| Gate to Drain Charge | $Q_{gd}$ | | 12 | | | |
| Total Gate Charge | $Q_g$ | | 48 | | | |

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

| Characteristics | Symbol | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|
| Diode Forward Voltage | $V_{SD}$ | 4.5 | | V | $V_{GS}$ = -4 V, $I_{SD}$ = 8.9 A |
| | | 4 | | V | $V_{GS}$ = -4 V, $I_{SD}$ = 8.9 A, $T_{VJ}$ = 175 °C |
| Reverse Recovery Time | $t_{rr}$ | 25 | | ns | $V_{GS}$ = -4 V, $I_{SD}$ = 17.9 A, $V_R$ = 800 V<br>dif/dt = 1925 A/µs, $T_{VJ}$ = 175 °C |
| Reverse Recovery Charge | $Q_{rr}$ | 109 | | nC | |
| Peak Reverse Recovery Current | $I_{rrm}$ | 11 | | A | |

## Typical Performance

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

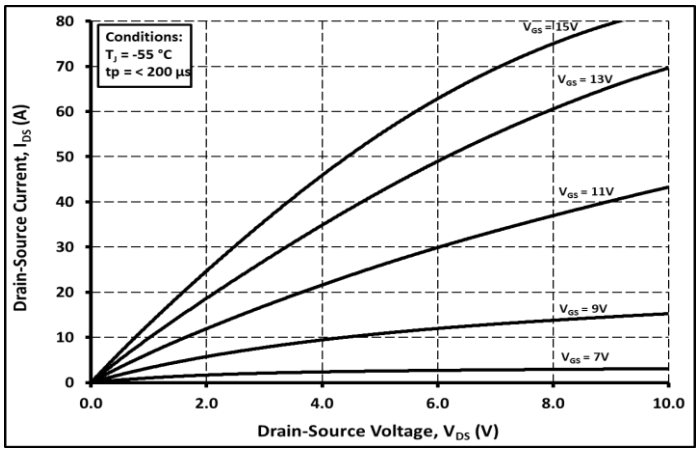



**Figure 1.**

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

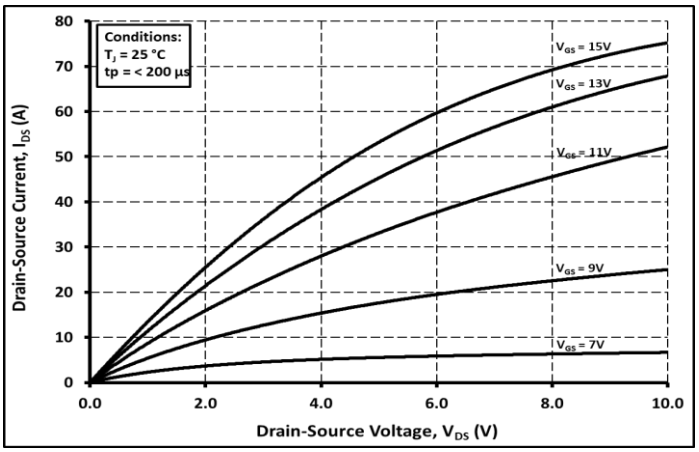



**Figure 2.**

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

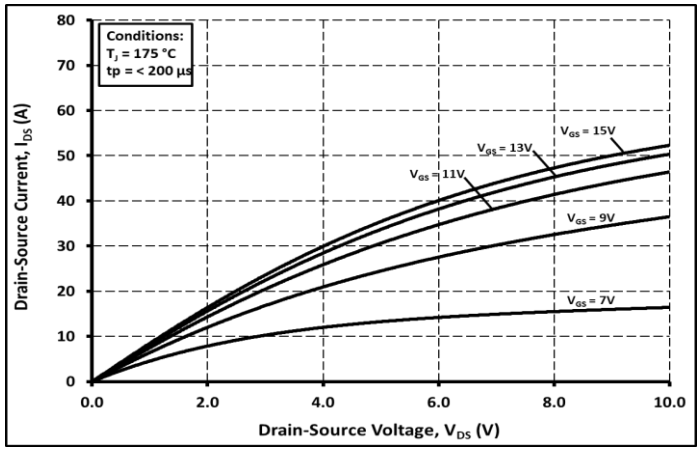



**Figure 3.**

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

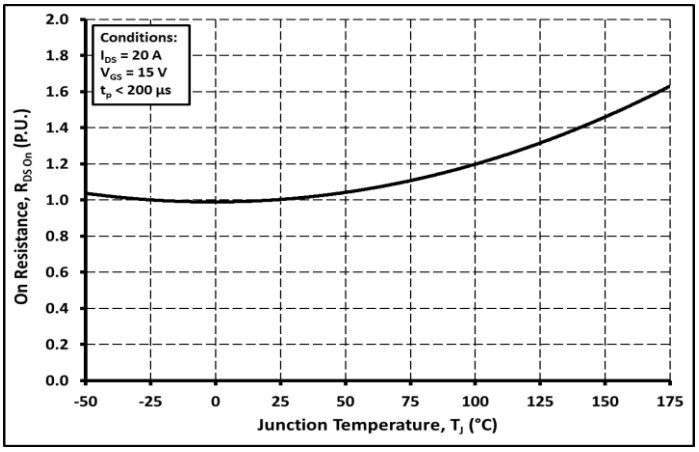



**Figure 4.**

Normalized On-Resistance vs. Temperature

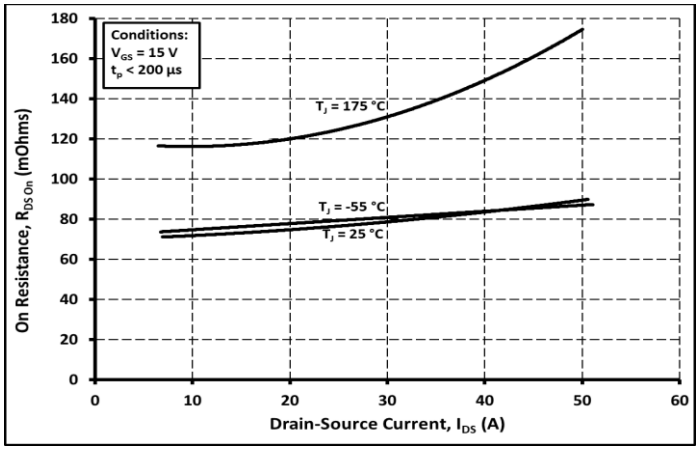



**Figure 5.**

On-Resistance vs. Drain Current For Various Temperatures

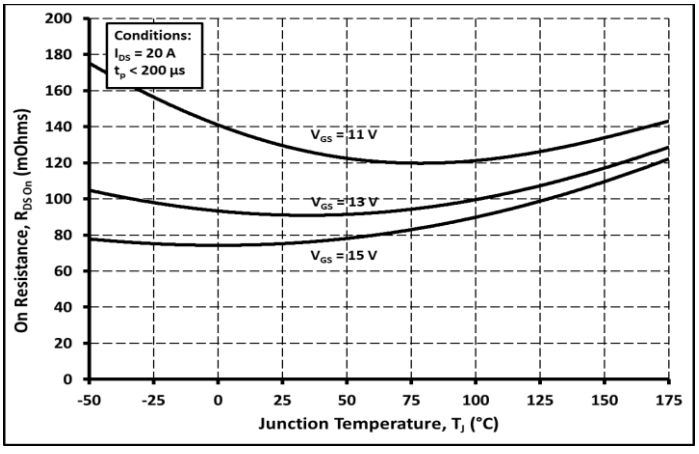



**Figure 6.**

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.

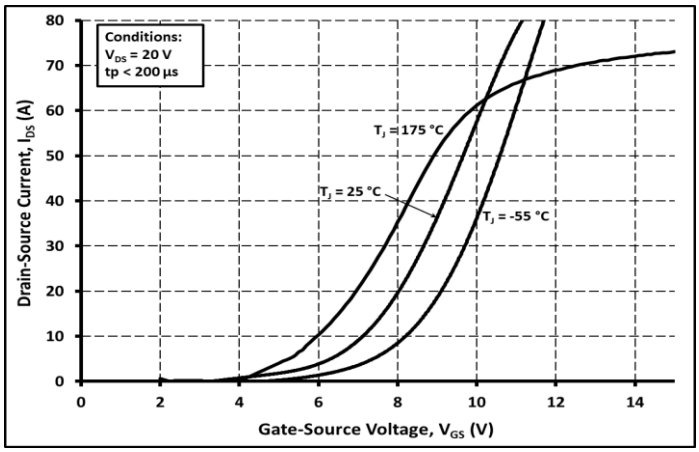



**Figure 7.**

Transfer Characteristic For Various Junction Temperatures

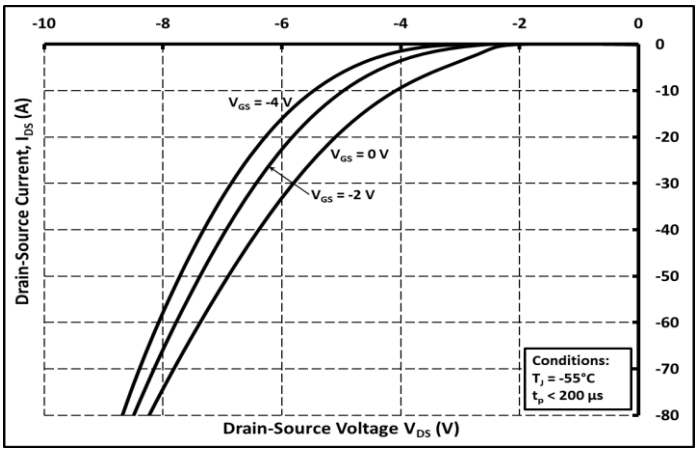



**Figure 8.**

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

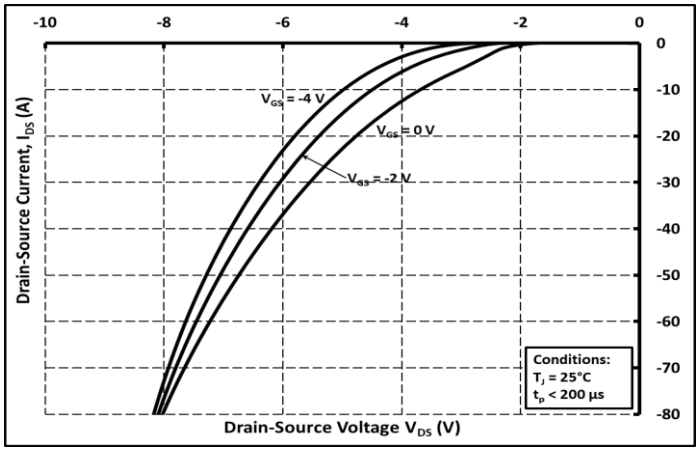



**Figure 9.**

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

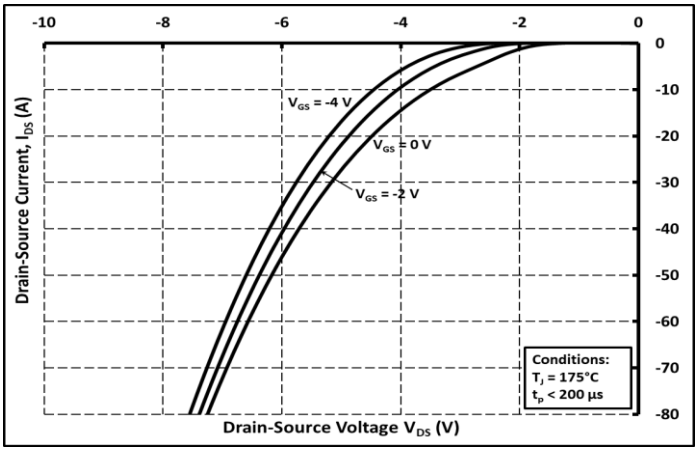



**Figure 10.**

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

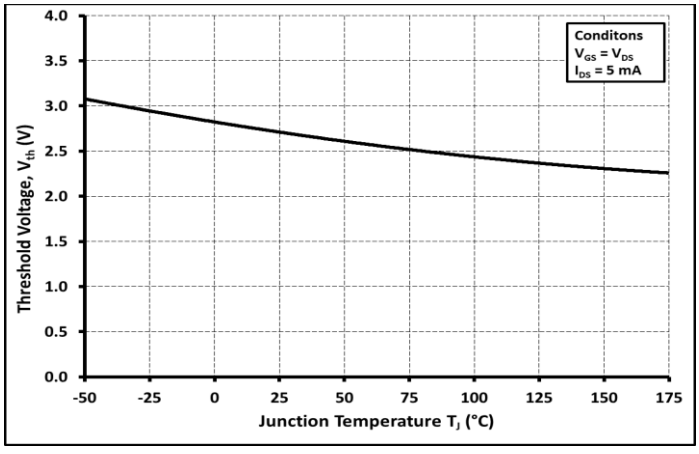



**Figure 11.**

Threshold Voltage vs. Temperature

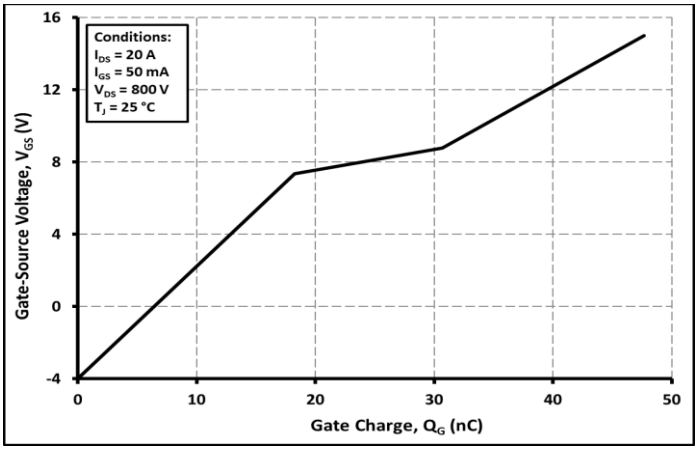



**Figure 12.**

Gate Charge Characteristics

## Typical Performance

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

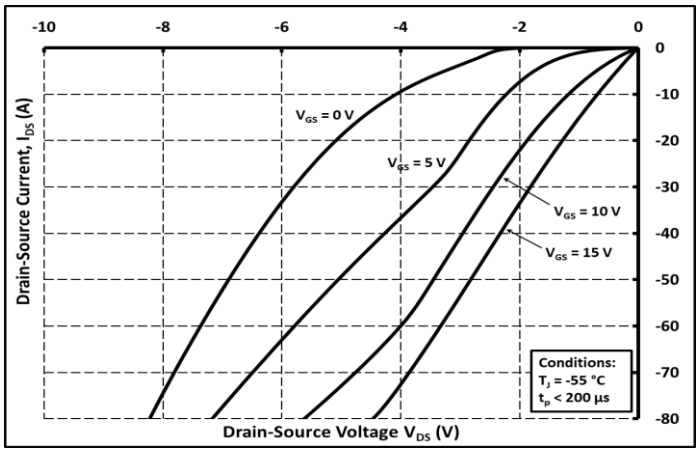



**Figure 13.**

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

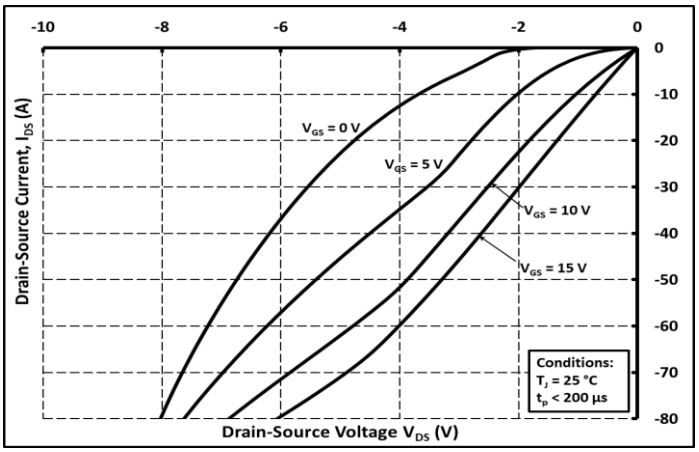



**Figure 14.**

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

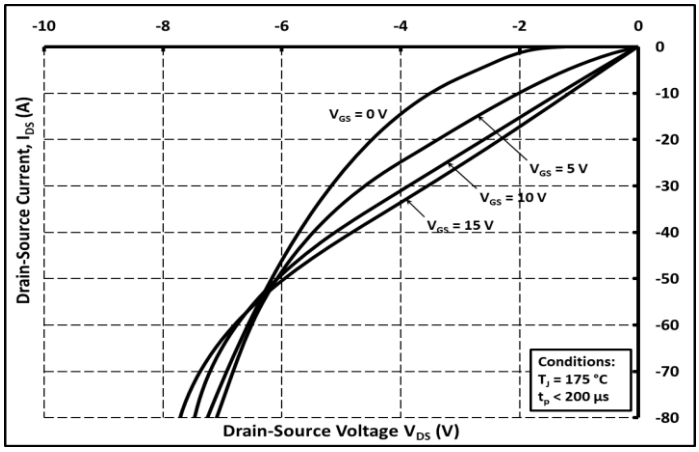



**Figure 15.**

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

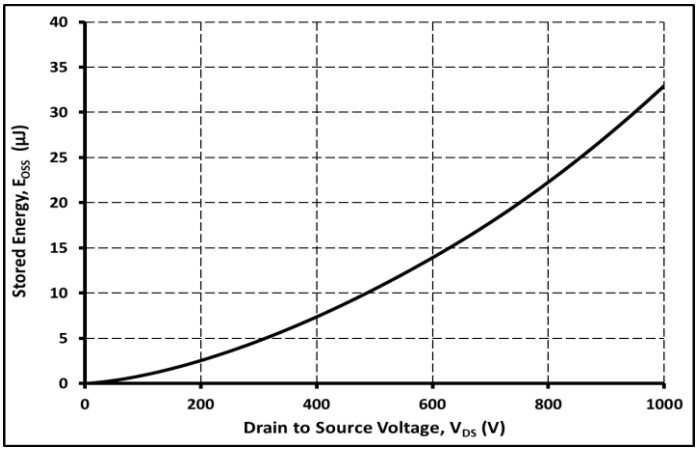



**Figure 16.**

Output Capacitor Stored Energy

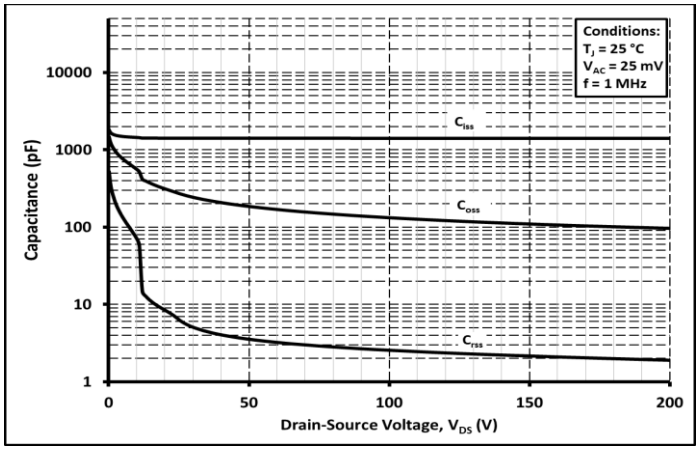



**Figure 17.**

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

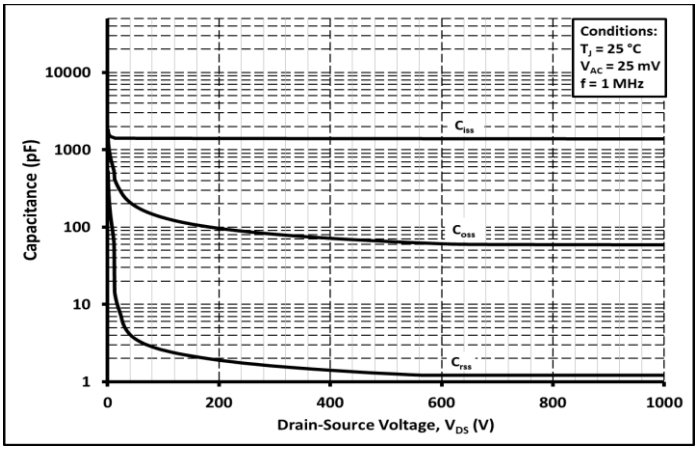



**Figure 18.**

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

## Product Ordering Information

| Order Number | Description | Package |
|---|---|---|
| CPM3-1200-0075A-FY6 | SIC MOSFET G3 IND 1200V/75mO UV MLT | Bare Die Product |
| CPM3-1200-0075A-GQ8 | SIC MOSFET G3 IND 1200V/75mO UV MVF | Bare Die Product |

## Revision History

| Revision History | Date of Change | Brief Summary |
|---|---|---|
| - | 04/4/2019 | Initial Release |
| 1 | 12/4/2019 | • Removed test conditions and note section from the Maximum Ratings Table<br>• Updated description for all the parameters in the Maximum Ratings Table<br>• Updated footnotes<br>• Temperature note removed and embedded into every test condition<br>• Updated test conditions for gate threshold voltage, drain-source on-state resistance, transconductance, gate to source charge, gate to drain charge, total gate charge, diode forward voltage, reverse recovery time, reverse recovery charge and peak reverse recovery current<br>• Updated typical values for continuous drain current, zero gate voltage drain current, gate-source leakage current, drain-source on-state resistance, transconductance, input capacitance, reverse transfer capacitance, Coss stored energy, gate to source charge, gate to drain charge, total gate charge, reverse recovery time and reverse recovery charge<br>• All junction temperatures changed to virtual junction temperatures<br>• All graphs updated to reflect the most recent test data |
| 2 | 3/30/2020 | • Removed maximum rating comment<br>• Added maximum processing temperature |
| 3 | 7/30/2023 | • Document format updated |

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