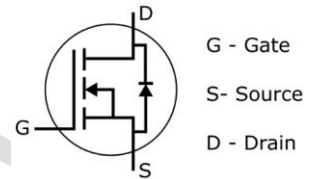
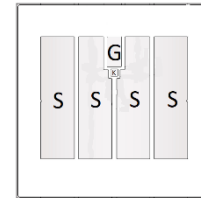


# CPM3-6500-R100A

SiC 6.5 kV, 105 mΩ MOSFET Bare Die

## Description

This high-performance silicon carbide MOSFET die is developed to maximize the performance and simplify the design architecture of mid and high-voltage applications. This device can be implemented into any custom package providing additional design flexibility.



| Part Number     | Die Size (mm) |
|-----------------|---------------|
| CPM3-6500-R100A | 8.1 × 8.1     |

[Request for Full Datasheet Here](#)

## Features

- Easy to parallel and simple to drive
- Temperature-independent high-speed switching
- Integrated lumped gate resistance
- Enhanced Reliability
- Maintains reliable performance during reverse power flow

## Typical Applications

- Pulsed Power
- Medium-Voltage Drives
- Solid-State Transformers
- Smart Grid/Grid-Tie Distributed Generation
- High-Voltage Power Supplies

## Absolute Maximum Ratings

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

| Parameter                                               | Symbol            | Rating               |           |      | Unit |
|---------------------------------------------------------|-------------------|----------------------|-----------|------|------|
|                                                         |                   | Min                  | Typ       | Max  |      |
| Drain-Source Voltage, across $T_{VJ}$                   | $V_{DS(max)}$     | 6500                 |           |      | V    |
| Maximum Gate-Source Voltage, Peak Transient Capability  | $V_{GS(max)}$     | -10                  |           | +25  | V    |
| Recommended Negative Gate-Source Voltage                | $V_{GS(op), off}$ |                      | -5        |      | V    |
| Recommended Positive Gate-Source Voltage                | $V_{GS(op), on}$  |                      | +15...+20 |      |      |
| Continuous Drain Current <sup>1</sup>                   | $I_{DS}$          | $T_c = 25\text{ °C}$ | 30        |      | A    |
|                                                         |                   | $T_c = 90\text{ °C}$ | 23        |      |      |
| Pulsed Drain Current, $t_p$ limited by $T_{VJ(max)}$    | $I_{DS(pulse)}$   |                      | 60        |      | A    |
| Virtual Junction and Storage Temperature                | $T_{VJ}, T_{stg}$ | -55                  |           | +175 | °C   |
| Maximum Processing Temperature, in non-reactive ambient | $T_{proc}$        |                      | 325       |      | °C   |

Note 1. Assume testing at  $V_{GS} = +20\text{ V}$ , with a junction-to-case thermal resistance  $R_{TH(J-C)} = 0.47\text{ °C/W}$ .


**Electrical Characteristics ( $T_{VJ} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)**

| Characteristics                                                                                                     | Symbol        | Min. | Typ.               | Max. | Unit          | Test Conditions                                                                                                                                                                                | Note |
|---------------------------------------------------------------------------------------------------------------------|---------------|------|--------------------|------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Drain-Source Breakdown Voltage                                                                                      | $V_{(BR)DSS}$ | 6.5  |                    |      | kV            | $V_{GS} = 0\text{ V}$ , $I_{DS} = 100\text{ }\mu\text{A}$                                                                                                                                      |      |
| Gate Threshold Voltage                                                                                              | $V_{GS(th)}$  | 2.6  | 3.5                | 4.4  | V             | $V_{DS} = V_{GS}$ , $I_{DS} = 40.7\text{ mA}$                                                                                                                                                  |      |
|                                                                                                                     |               |      | 3.0                |      | V             | $V_{DS} = V_{GS}$ , $I_{DS} = 40.7\text{ mA}$ , $T_{VJ} = 175\text{ }^{\circ}\text{C}$                                                                                                         |      |
| Zero Gate Voltage Drain Current                                                                                     | $I_{DSS}$     |      | 5                  | 10   | $\mu\text{A}$ | $V_{DS} = 6.5\text{ kV}$ , $V_{GS} = 0\text{ V}$                                                                                                                                               |      |
| Gate-Source Leakage Current                                                                                         | $I_{GSS}$     |      | 10                 |      | nA            | $V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$                                                                                                                                                 |      |
| Drain-Source On-State Resistance                                                                                    | $R_{DS(on)}$  |      | 105                | 136  | m $\Omega$    | $V_{GS} = 15\text{ V}$ , $I_{DS} = 30\text{ A}$                                                                                                                                                |      |
|                                                                                                                     |               |      | 350                |      |               | $V_{GS} = 15\text{ V}$ , $I_{DS} = 30\text{ A}$ , $T_{VJ} = 175\text{ }^{\circ}\text{C}$                                                                                                       |      |
| Transconductance                                                                                                    | $g_{fs}$      |      | 19.8               |      | S             | $V_{DS} = 20\text{ V}$ , $I_{DS} = 30\text{ A}$                                                                                                                                                |      |
|                                                                                                                     |               |      | 19.3               |      |               | $V_{DS} = 20\text{ V}$ , $I_{DS} = 30\text{ A}$ , $T_{VJ} = 175\text{ }^{\circ}\text{C}$                                                                                                       |      |
| Turn-On Switching Energy<br>$T_J = 25\text{ }^{\circ}\text{C}$<br>125 $^{\circ}\text{C}$<br>175 $^{\circ}\text{C}$  | $E_{ON}$      |      | 4.2<br>7.4<br>15.6 |      | mJ            | $V_{DS} = \text{TBD V}$ , $V_{GS} = -5/+15\text{ V}$ , $I_D = 30\text{ A}$ ,<br>$R_{G(ON)} = 10\text{ }\Omega$ , $R_{G(ON)} = 8\text{ }\Omega$ ,<br>Timing relative to $V_{DS}$ Inductive Load |      |
| Turn-Off Switching Energy<br>$T_J = 25\text{ }^{\circ}\text{C}$<br>125 $^{\circ}\text{C}$<br>175 $^{\circ}\text{C}$ | $E_{OFF}$     |      | 4.8<br>5.1<br>5.4  |      |               |                                                                                                                                                                                                |      |
| Input Capacitance                                                                                                   | $C_{iss}$     |      | 10.4               |      | nF            |                                                                                                                                                                                                |      |
| Output Capacitance                                                                                                  | $C_{oss}$     |      | 71                 |      | pF            | $V_{GS} = 0\text{ V}$ , $V_{DS} = 3000\text{ V}$<br>$f = 100\text{ kHz}$<br>$V_{AC} = 25\text{ mV}$                                                                                            |      |
| Reverse Transfer Capacitance                                                                                        | $C_{rss}$     |      | 5.9                |      |               |                                                                                                                                                                                                |      |
| $C_{oss}$ Stored Energy                                                                                             | $E_{oss}$     |      | 750                |      | $\mu\text{J}$ | $V_{DS} = 3000\text{ V}$ , $f = 100\text{ kHz}$                                                                                                                                                |      |
| Internal Gate Resistance                                                                                            | $R_{G(int)}$  |      | 7.2                |      | $\Omega$      | $f = 100\text{ kHz}$ , $V_{AC} = 25\text{ mV}$                                                                                                                                                 |      |

**Body Diode Characteristics ( $T_{VJ} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)**

| Characteristics               | Symbol    | Min. | Typ. | Max. | Unit | Test Conditions                                                                                                                                          | Note |
|-------------------------------|-----------|------|------|------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Diode Forward Voltage         | $V_{SD}$  |      | 5.3  |      | V    | $V_{GS} = -5\text{ V}$ , $I_{SD} = 15\text{ A}$                                                                                                          |      |
|                               |           |      | 5.2  |      | V    | $V_{GS} = -5\text{ V}$ , $I_{SD} = 15\text{ A}$ , $T_{VJ} = 175\text{ }^{\circ}\text{C}$                                                                 |      |
| Reverse Recovery Time         | $t_{rr}$  |      | 56.6 |      | ns   | $V_{GS} = -5\text{ V}$ , $I_{SD} = 30\text{ A}$ , $V_R = 3600\text{ V}$ ;<br>$di/dt = 520\text{ A}/\mu\text{s}$ , $T_{VJ} = 175\text{ }^{\circ}\text{C}$ |      |
| Reverse Recovery Charge       | $Q_{rr}$  |      | 379  |      | nC   |                                                                                                                                                          |      |
| Peak Reverse Recovery Current | $I_{rrm}$ |      | 10.9 |      | A    |                                                                                                                                                          |      |

## Notes & Disclaimers

WOLFSPEED PROVIDES TECHNICAL AND RELIABILITY DATA, DESIGN RESOURCES, APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, WITH RESPECT THERETO, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, SUITABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD-PARTY INTELLECTUAL PROPERTY RIGHTS.

This document and the information contained herein are subject to change without notice. Any such change shall be evidenced by the publication of an updated version of this document by Wolfspeed. No communication from any employee or agent of Wolfspeed or any third party shall effect an amendment or modification of this document. No responsibility is assumed by Wolfspeed for any infringement of patents or other rights of third parties which may result from use of the information contained herein. No license is granted by implication or otherwise under any patent or patent rights of Wolfspeed.

The information contained in this document (excluding examples, as well as Fig.s or values that are labeled as “typical”) constitutes Wolfspeed’s sole published specifications for the subject product. “Typical” parameters are the average values expected by Wolfspeed in large quantities and are provided for informational purposes only. Any examples provided herein have not been produced under conditions intended to replicate any specific end use. Product performance can and does vary due to a number of factors.

This product has not been designed or tested for use in, and is not intended for use in, any application in which failure of the product would reasonably be expected to cause death, personal injury, or property damage. For purposes of (but without limiting) the foregoing, this product is not designed, intended, or authorized for use as a critical component in equipment implanted into the human body, life-support machines, cardiac defibrillators, and similar emergency medical equipment; air traffic control systems; or equipment used in the planning, construction, maintenance, or operation of nuclear facilities. Notwithstanding any application-specific information, guidance, assistance, or support that Wolfspeed may provide, the buyer of this product is solely responsible for determining the suitability of this product for the buyer’s purposes, including without limitation (1) selecting the appropriate Wolfspeed products for the buyer’s application, (2) designing, validating, and testing the buyer’s application, and (3) ensuring the buyer’s application meets applicable standards and any other legal, regulatory, and safety-related requirements.

### 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 Directive 2011/65/EC (RoHS2), as implemented January 2, 2013. RoHS Declarations for this product can be obtained from your Wolfspeed representative or from the Product Documentation sections of [www.wolfspeed.com](http://www.wolfspeed.com).

### 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, please contact your Wolfspeed representative to ensure you get the most up-to-date REACH SVHC Declaration. REACH banned substance information (REACH Article 67) is also available upon request.

### Contact info:

4600 Silicon Drive  
Durham, NC 27703 USA  
Tel: +1.919.313.5300  
[www.wolfspeed.com/power](http://www.wolfspeed.com/power)