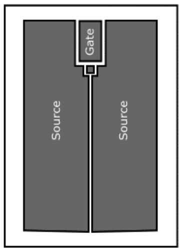
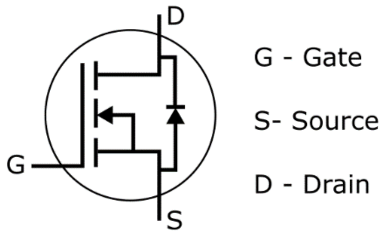
CPM3-3300-R050A

Wolfspeed SiC Gen3 MOSFET

Description

This is Wolfspeed's 3rd generation high-performance silicon carbide MOSFET in a package-less bare die format to be implemented into any custom module design.





Package Type: Bare Die
PN: CPM3-3300-R050A

Features

- Enhanced 3rd Generation SiC MOSFET
- High blocking voltage with low on-resistance
- Easy to parallel and simple to drive
- Temperature-independent high-speed switching
- Integrated lumped gate resistance

Typical Applications

- Medium-voltage motor drives
- Renewable energy
- Smart grid/grid-tie power generation
- Pulsed-power applications
- Rail traction

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}	$V_{DS(max)}$		3300	V
Maximum Gate-Source Voltage, Peak Transient Capability	$V_{GS(max)}$		-10/+20	V
Continuous Drain Current, V_{GS} = 15 V, assumes die packaged with typical $R_{th(j-c)}$ = 0.41 K/W	I_{DS}	T_c = 25 °C	52	A
		T_c = 100 °C	36	
Pulsed Drain Current, t_p limited by $T_{VJ(max)}$	$I_{DS(pulse)}$		104	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	$V_{GS(op)}$	-5/+15	V

Electrical Characteristics (T_{VJ} = 25 °C unless otherwise specified)

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	3300			V	V_{GS} = 0 V, I_{DS} = 100 µA
Gate Threshold Voltage	$V_{GS(th)}$	2.6	3.5	4.4	V	V_{DS} = V_{GS}, I_{DS} = 26.5 mA
			2.6		V	V_{DS} = V_{GS}, I_{DS} = 26.5 mA, T_{VJ} = 175 °C
Zero Gate Voltage Drain Current	I_{DSS}		5	30	µA	V_{DS} = 3300 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	$R_{DS(on)}$		53	69	mΩ	V_{GS} = 15 V, I_{DS} = 40 A
			136			V_{GS} = 15 V, I_{DS} = 40 A, T_{VJ} = 175 °C
Transconductance	g_{fs}		26		S	V_{DS} = 20 V, I_{DS} = 40 A
			27			V_{DS} = 20 V, I_{DS} = 40 A, T_{VJ} = 175 °C
Input Capacitance	C_{iss}		7240		pF	V_{GS} = 0 V, V_{DS} = 1800 V f = 100 kHz V_{AC} = 25 mV
Output Capacitance	C_{oss}		100			
Reverse Transfer Capacitance	C_{rss}		6			
C_{oss} Stored Energy	E_{oss}		210		µJ	V_{DS} = 1800 V, f = 100 kHz
Internal Gate Resistance	$R_{G(int)}$		8.8		Ω	f = 100 kHz, V_{AC} = 25 mV
Gate to Source Charge	Q_{gs}		131		nC	V_{DS} = 2000 V, V_{GS} = -5 V/+15 V I_{DS} = 50 A
Gate to Drain Charge	Q_{gd}		19			
Total Gate Charge	Q_g		255			

Reverse Diode Characteristics (T_{VJ} = 25 °C unless otherwise specified)

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Diode Forward Voltage	V_{SD}		4.9		V	V_{GS} = -5 V, I_{SD} = 20 A
			4.1		V	V_{GS} = -5 V, I_{SD} = 20 A, T_{VJ} = 175 °C
Reverse Recovery Time	t_{rr}		126		ns	V_{GS} = -5 V, I_{SD} = 40 A, V_R = 1800 V; di_f/dt = 700 A/µs, T_{VJ} = 175 °C
Reverse Recovery Charge	Q_{rr}		2970		nC	
Peak Reverse Recovery Current	I_{rrm}		47		A	

Typical Performance

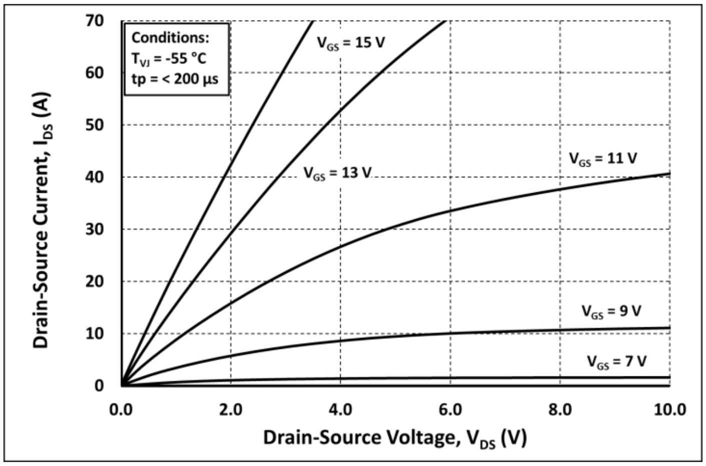


Figure 1.
Output Characteristics at T_{VJ} = -55 °C

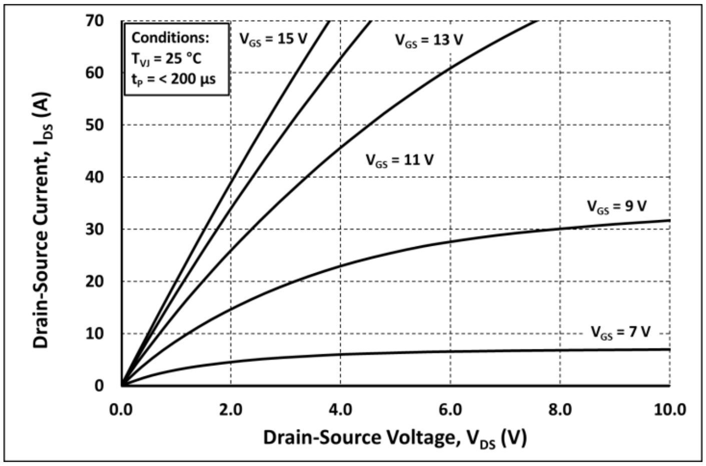


Figure 2.
Output Characteristics at T_{VJ} = 25 °C

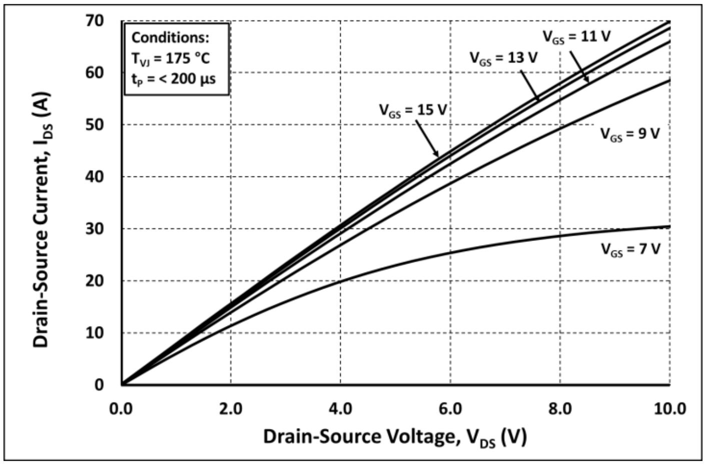


Figure 3.
Output Characteristics at T_{VJ} = 175 °C

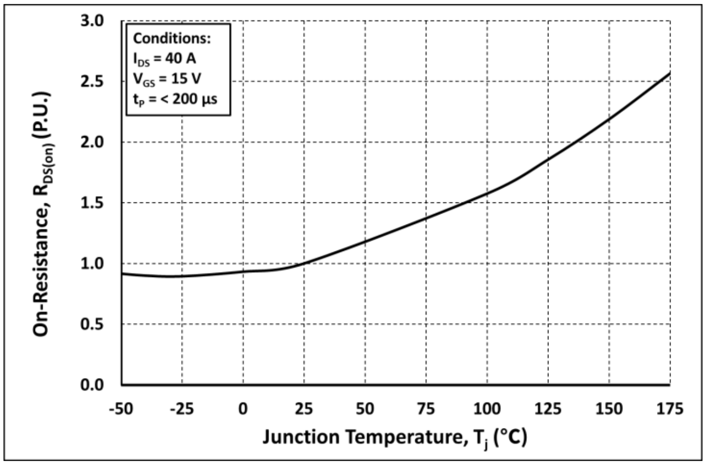


Figure 4.
Normalized On-Resistance vs. Temperature

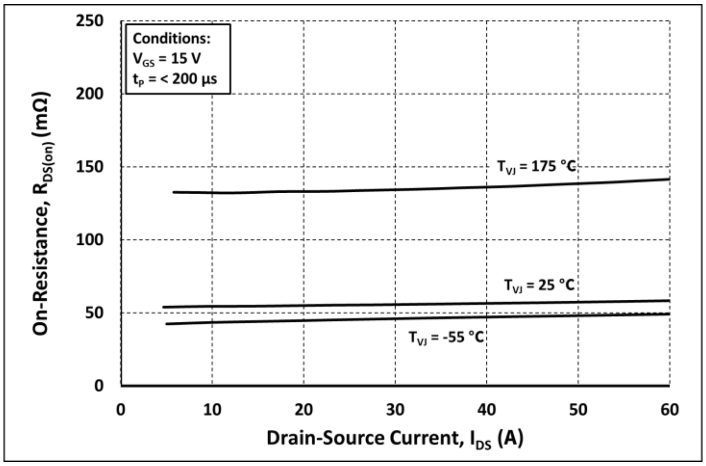


Figure 5.
On-Resistance vs. Drain Current for Various Temperatures

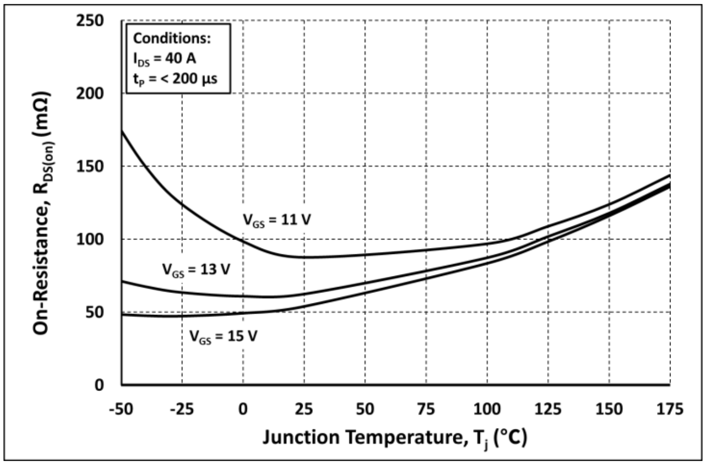


Figure 6.
On-Resistance vs. Temperature for Various Gate Voltages

Typical Performance

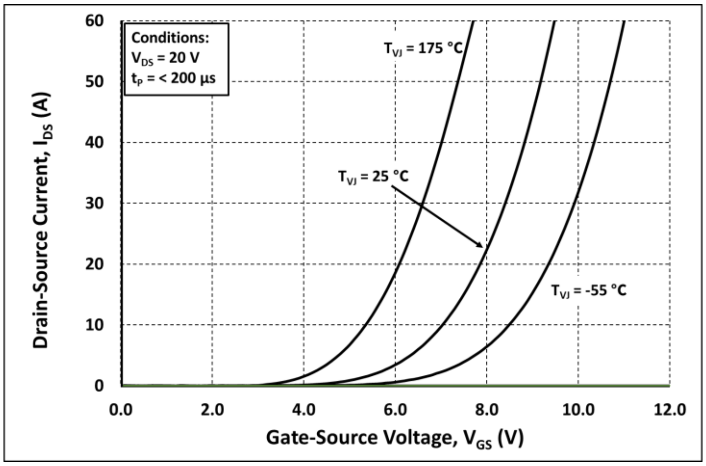


Figure 7.
Transfer Characteristic for Various Junction Temperatures

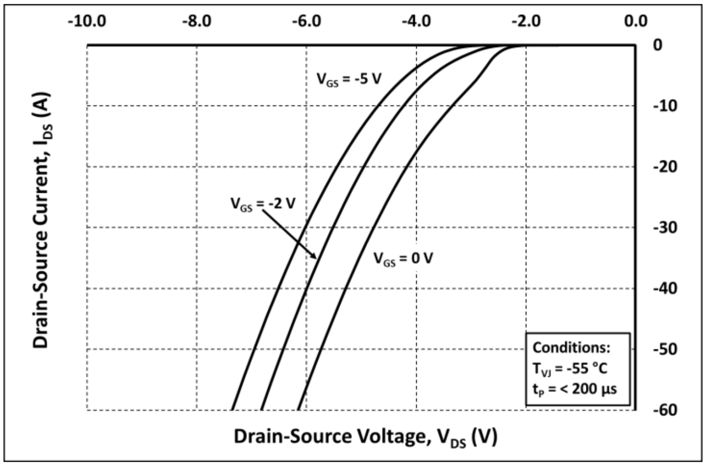


Figure 8.
Body Diode Characteristics at T_{VJ} = -55 °C

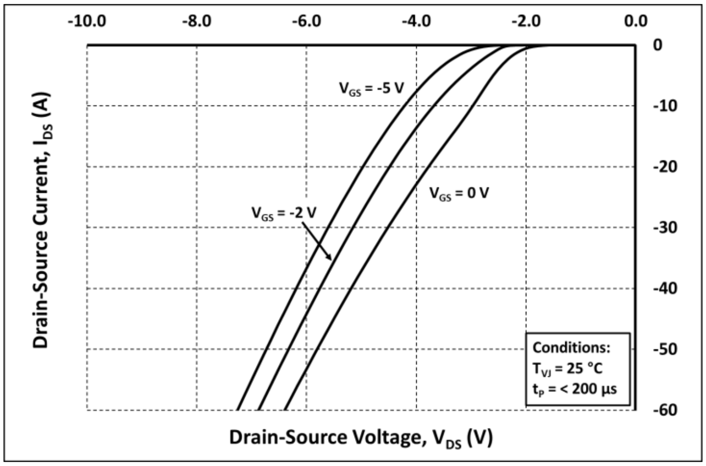


Figure 9.
Body Diode Characteristics at T_{VJ} = 25 °C

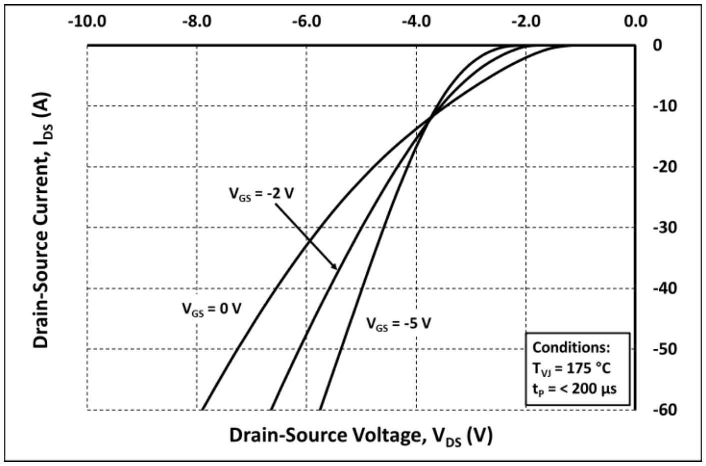


Figure 10.
Body Diode Characteristics at T_{VJ} = 175 °C

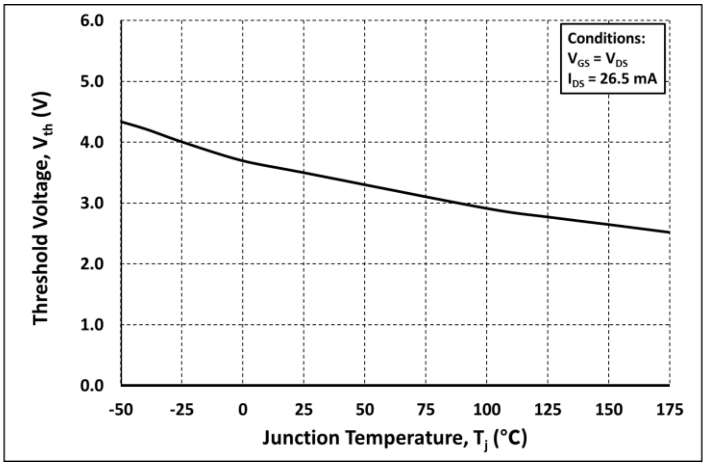


Figure 11.
Threshold Voltage vs. Temperature

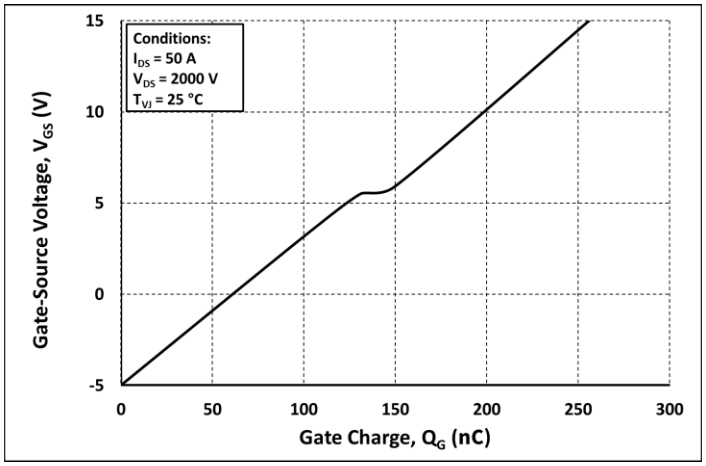


Figure 12.
Gate Charge Characteristic

Typical Performance

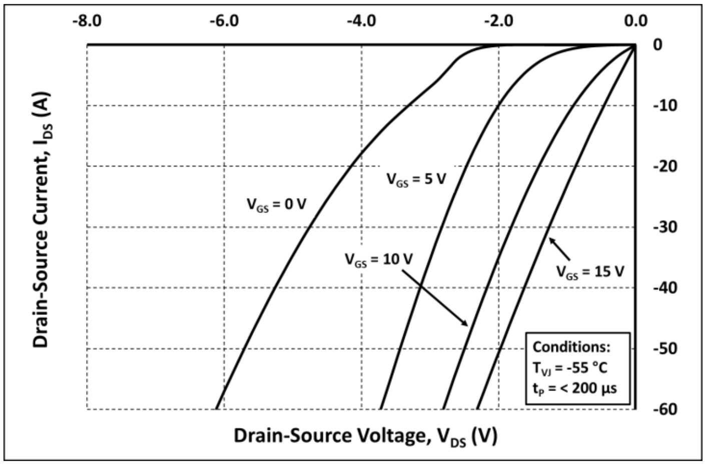


Figure 13.
3rd Quadrant Charactersitics at T_{VJ} = -55 °C

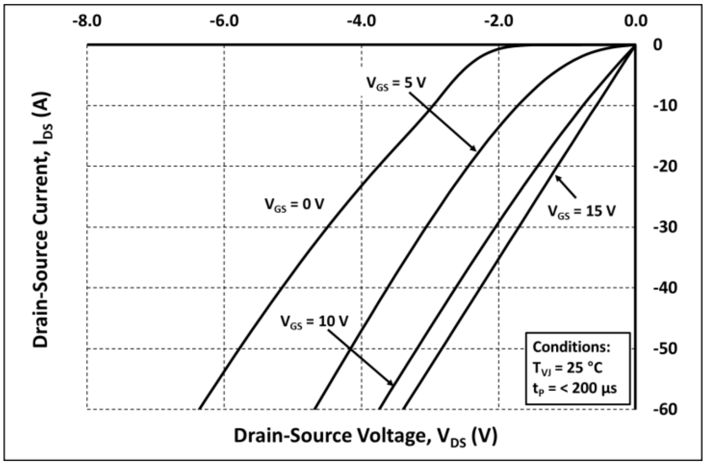


Figure 14.
3rd Quadrant Charactersitics at T_{VJ} = 25 °C

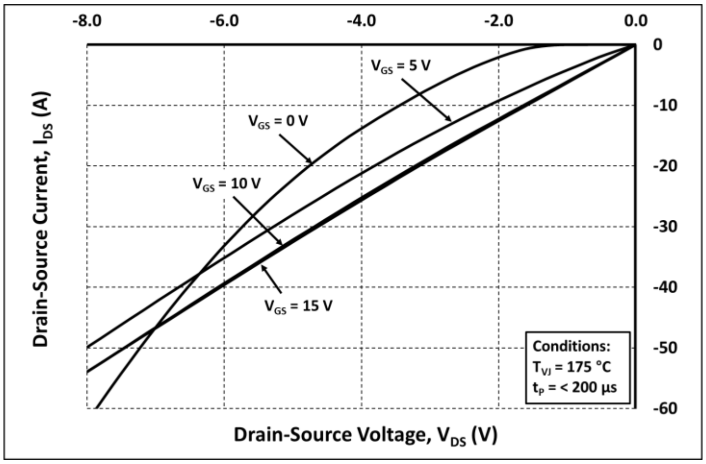


Figure 15.
3rd Quadrant Charactersitics at T_{VJ} = 175 °C

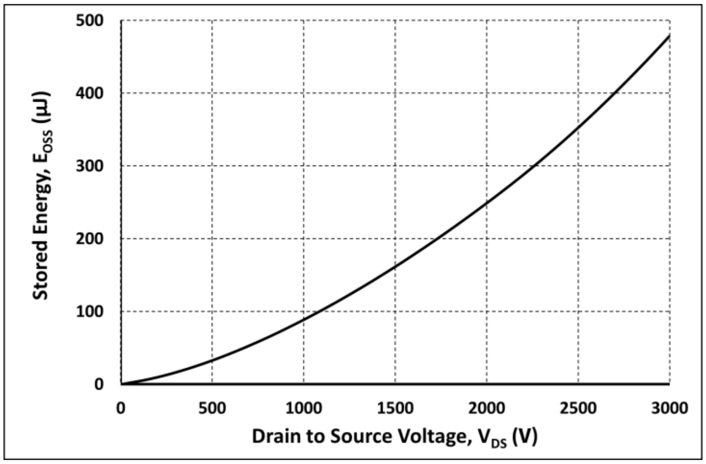


Figure 16.
Output Capacitor Stored Energy

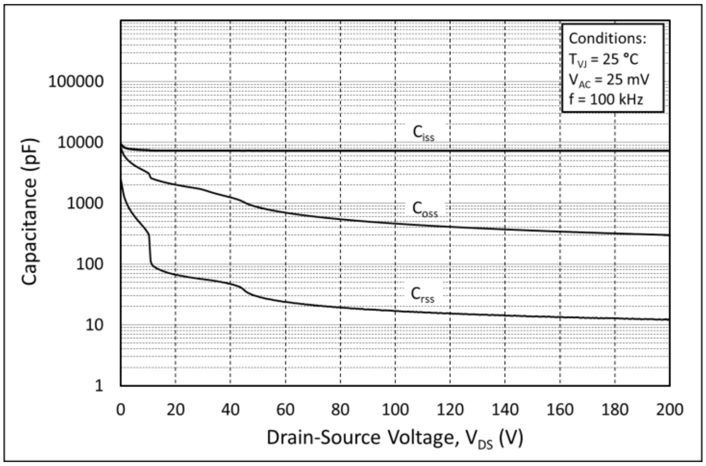


Figure 17.
Capacitances vs. Drain-Source Voltage (0 - 200 V)

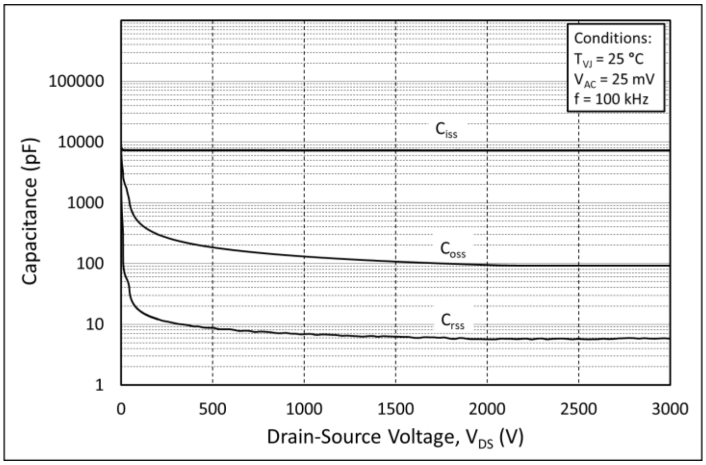
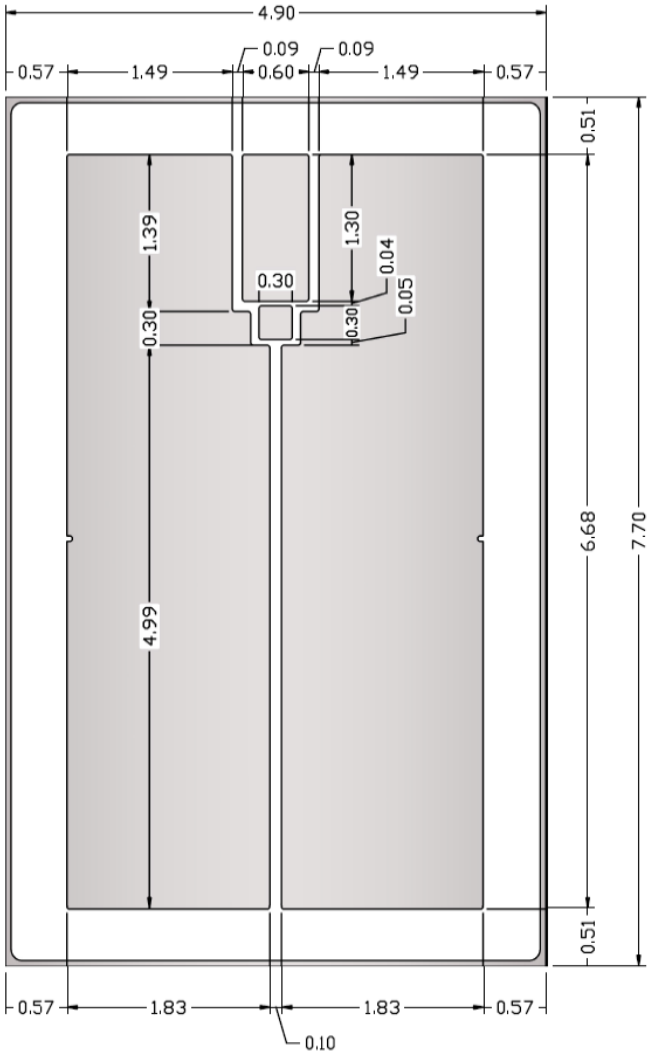


Figure 18.
Capacitances vs. Drain-Source Voltage (0 - 3000 V)

Product Dimensions CPM3-3300-R050A

Die Dimensions (mm)



Not Drawn to Scale

Mechanical Dimensions CPM3-3300-R050A

Parameter	Typical	Unit
Die Size (L × W)	4.90 × 7.70	mm
Exposed Source Pad Metal Dimensions	1.83 × 6.68 (× 2)	mm
Gate Pad Dimensions	0.6 × 1.3	mm
Chip Thickness[1]	400 ± 40	µm
Frontside (Source) Metallization (Al)	4	µm
Frontside (Gate) Metallization (Al)	4	µm
Backside (Drain) Metallization (Ni/Au)	0.8 / 0.1	µm

[1] SiC wafer thickness

Product Ordering Information

Order Number	Description	Package
CPM3-3300-R050A-FS6	3300V/53mΩ SiC MOSFET G3 IND UV DUR	Bare Die Product

Revision History

Revision Number	Date of Change	Brief Summary
1	04/28/2023	Initial Release.
2	09/20/2024	Disclaimers Update

Notes & Disclaimers

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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.

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