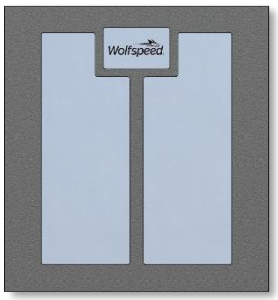
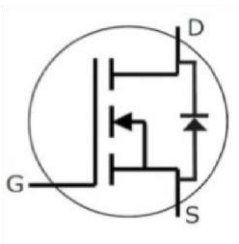
CPM4-0120-0104JS0A

Wolfspeed SiC Gen 4 MOSFET





Package Types: Bare Die
PN's: CPM4-0120-0104JS0A

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

- 4th Generation SiC MOSFET
- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- Soft body 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 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 $R_{th(j-c)}$ < 0.63 K/W	I_D	T_c = 25°C	55	A
		T_c = 100°C	40	
Pulsed Drain Current, t_p limited by $T_{vj(max)}$	$I_{D(pulse)}$		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	$V_{GS(op)}$	-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} = 7.11 mA
			2.2		V	V_{DS} = V_{GS}, I_{DS} = 7.11 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	$R_{DS(on)}$	29.4	42	54.6	mΩ	V_{GS} = 15 V, I_D = 25.8 A
			77			V_{GS} = 15 V, I_D = 25.8 A, T_{VJ} = 175°C
Transconductance	g_{fs}		16		S	V_{DS} = 20 V, I_{DS} = 25.8 A
			16			V_{DS} = 20 V, I_{DS} = 25.8 A, T_{VJ} = 175°C
Input Capacitance	C_{iss}		2370		pF	V_{GS} = 0 V, V_{DS} = 1000 V f = 100 kHz V_{AC} = 25 mV
Output Capacitance	C_{oss}		85			
Reverse Transfer Capacitance	C_{rss}		8			
C_{oss} Stored Energy	E_{oss}		107		µJ	V_{DS} = 1000 V, f = 100 kHz
Internal Gate Resistance	$R_{G(int)}$		5.9		Ω	f = 1 kHz, V_{AC} = 25 mV
Gate to Source Charge	Q_{gs}		19		nC	V_{DS} = 800 V, V_{GS} = -4 V/15 V I_{DS} = 25.8 A Per IEC60747-8-4 pg 21
Gate to Drain Charge	Q_{gd}		28			
Total Gate Charge	Q_g		93			

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} = 12.9 A
		4.4		V	V_{GS} = -4 V, I_{SD} = 12.9 A, T_{VJ} = 175 °C
Reverse Recovery Time	t_{rr}	24		ns	V_{GS} = -4 V, I_{SD} = 25.8 A, V_R = 800 V dif/dt = 4326 A/µs, T_{VJ} = 175 °C
Reverse Recovery Charge	Q_{rr}	496		nC	
Peak Reverse Recovery Current	I_{rrm}	33		A	

Typical Performance

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

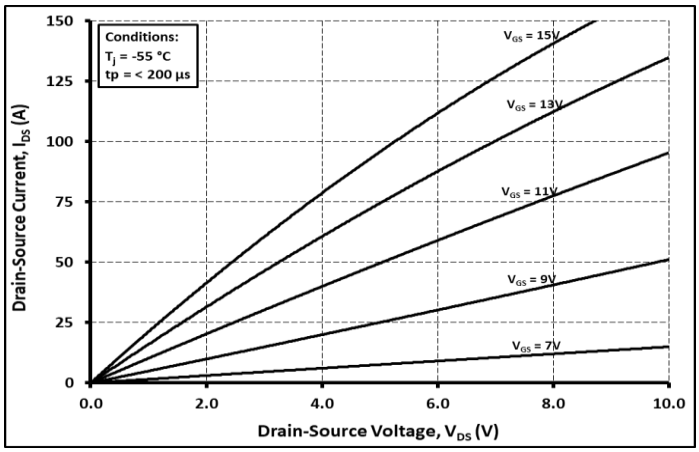

Figure 1.

Output Characteristics T_{vj} = -55 °C

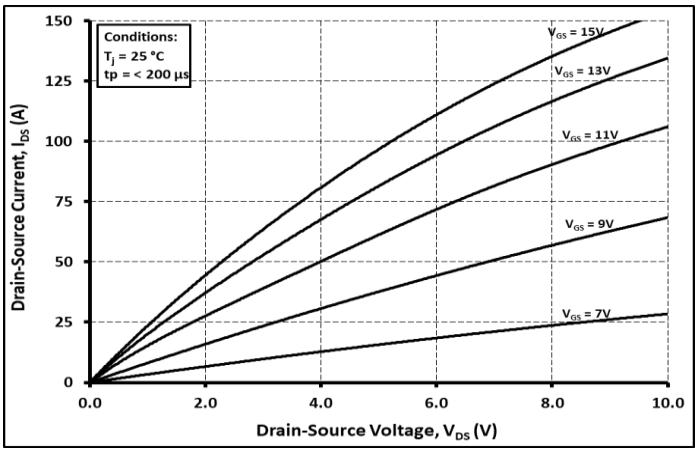

Figure 2.

Output Characteristics T_{vj} = 25 °C

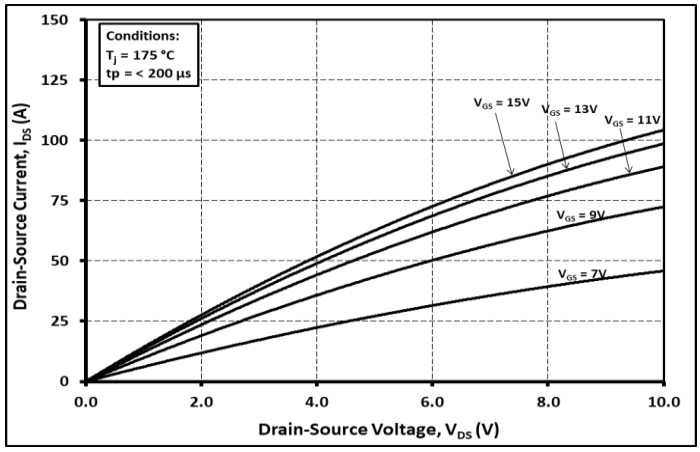

Figure 3.

Output Characteristics T_{vj} = 175 °C

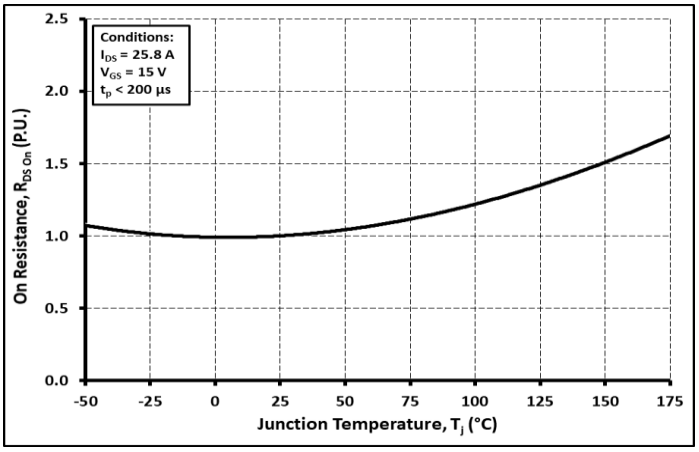

Figure 4.

Normalized On-Resistance vs. Temperature

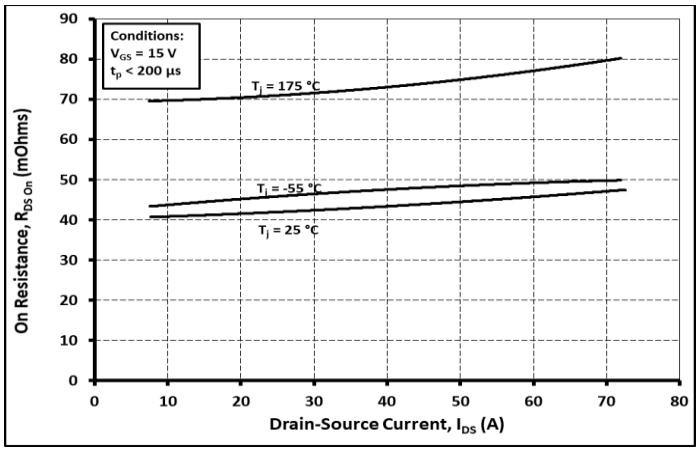

Figure 5.

On-Resistance vs. Drain Current For Various Temperatures

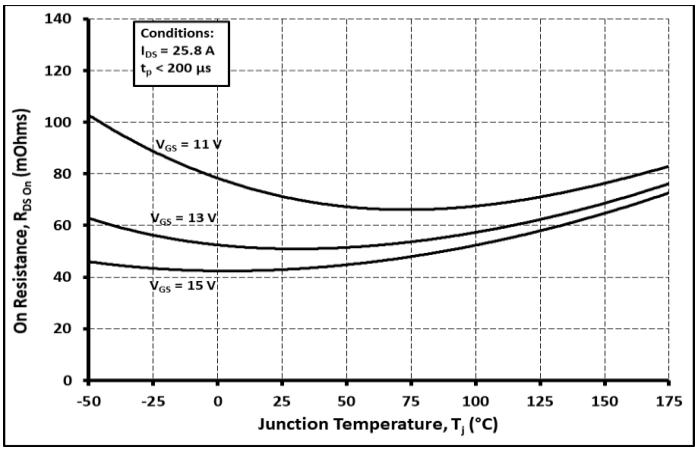

Figure 6.

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.

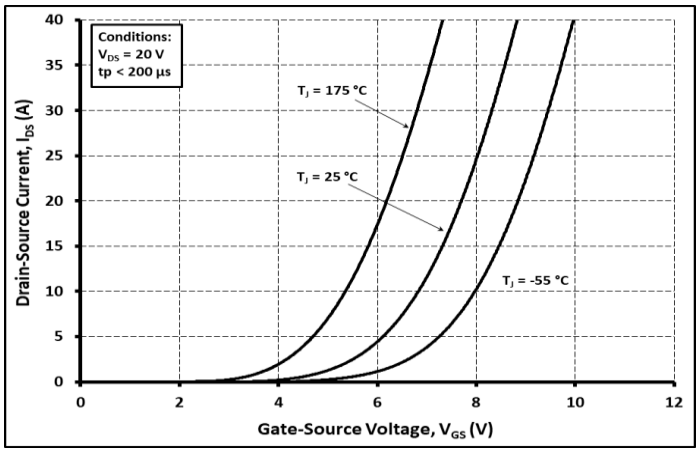

Figure 7.

Transfer Characteristic For Various Junction Temperatures

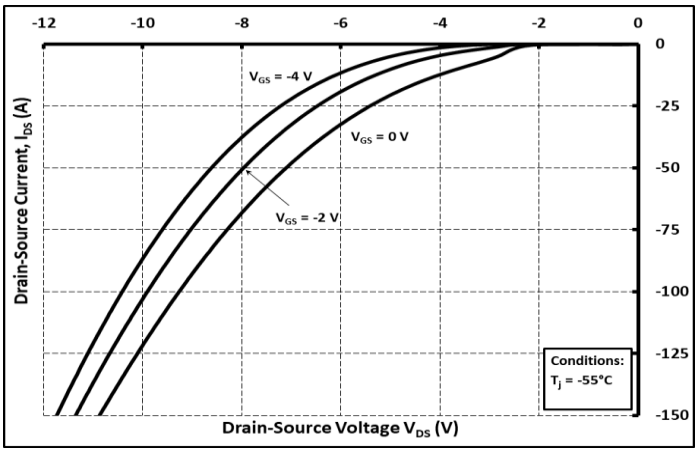

Figure 8.

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

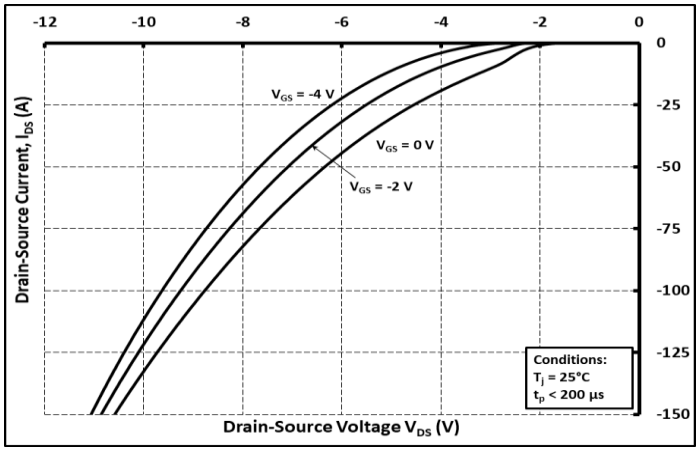

Figure 9.

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

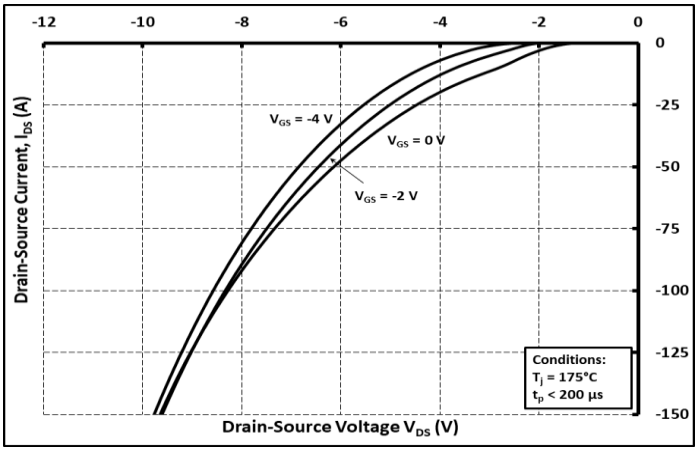

Figure 10.

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

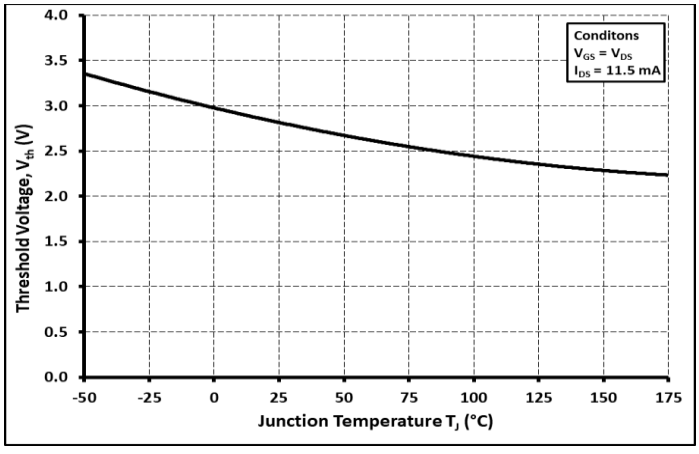

Figure 11.

Threshold Voltage vs. Temperature

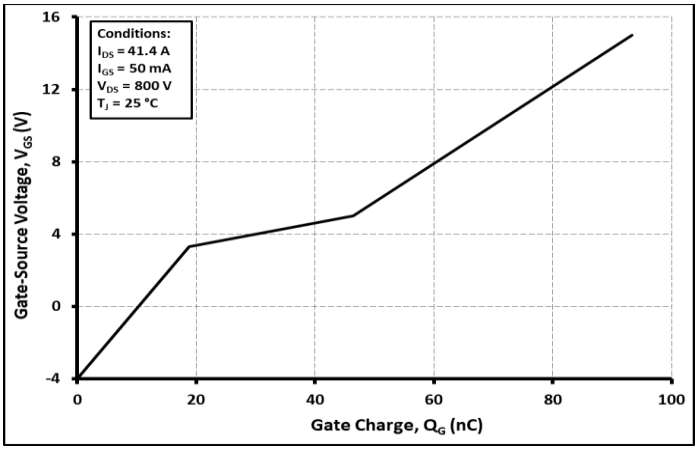

Figure 12.

Gate Charge Characteristics

Typical Performance

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

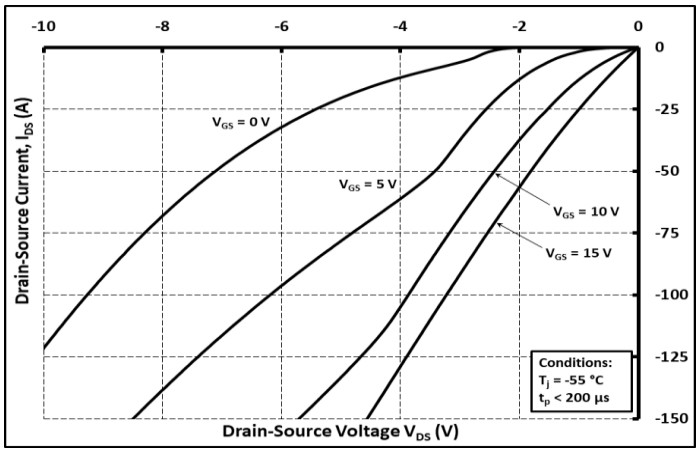

Figure 13.

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

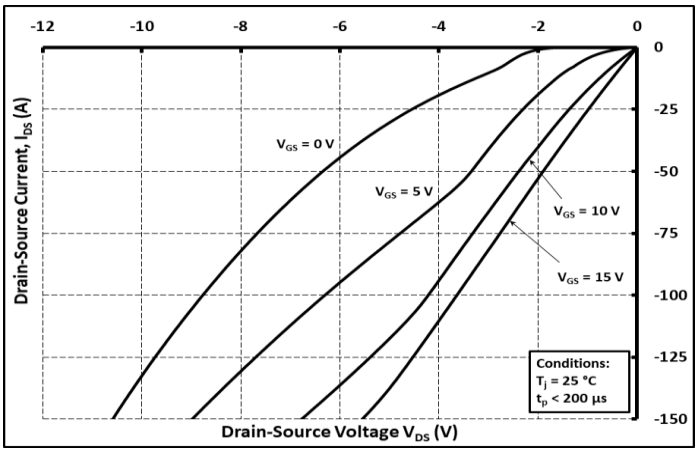

Figure 14.

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

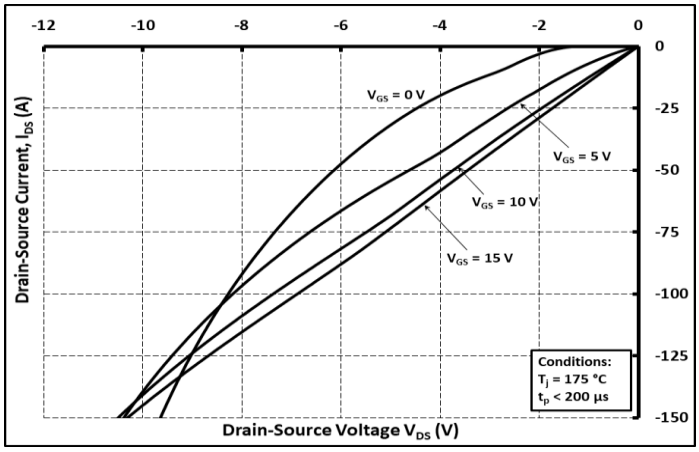

Figure 15.

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

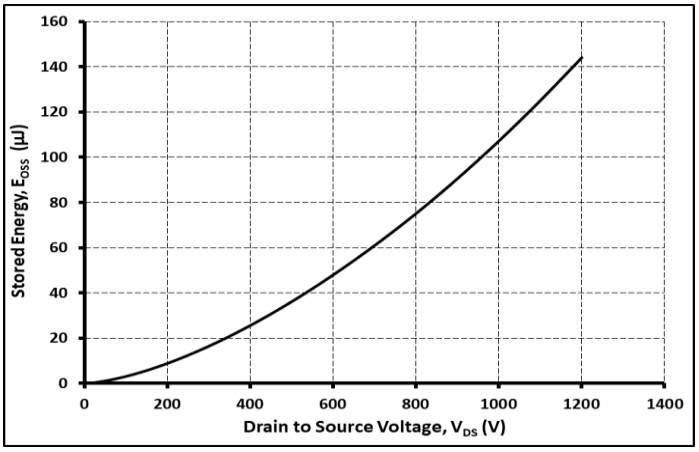

Figure 16.

Output Capacitor Stored Energy

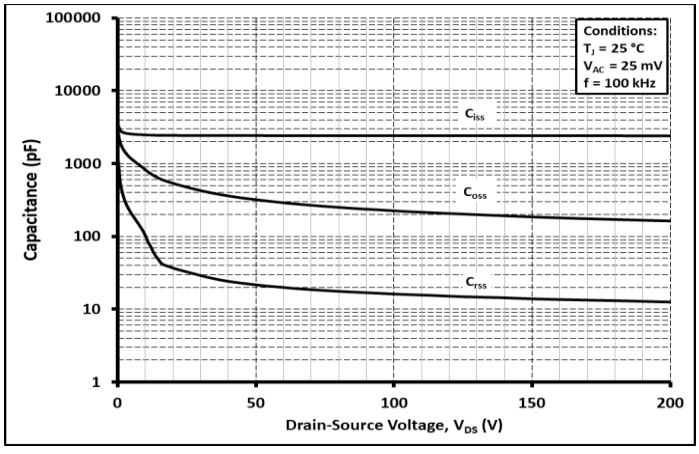

Figure 17.

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

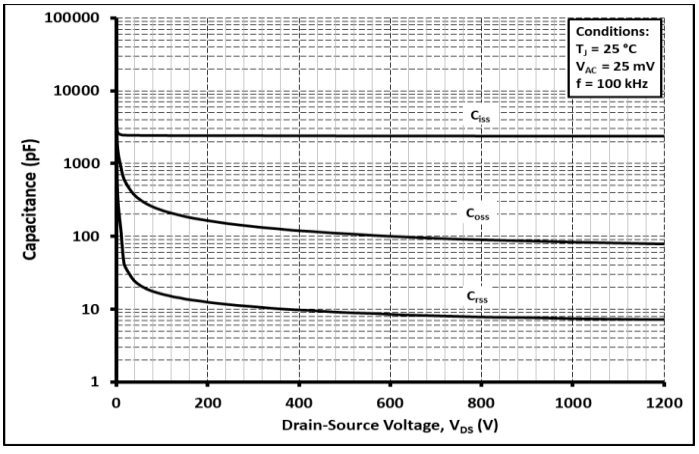

Figure 18.

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

Product Ordering Information

Order Number	Description	Package
CPM4-0120-0104JS0A-FY6	SiC MOSFET G4 IND 1200V/42mO UV MLT	Bare Die Product

Revision History

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

Notes & Disclaimer

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REACh Compliance

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