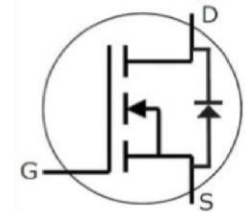
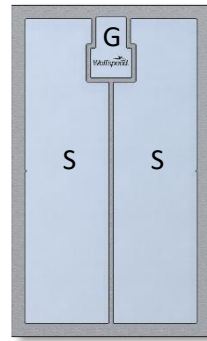


CPM3-1200-0013A

Wolfspeed SiC Gen 3 MOSFET

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 high frequency switching application including motor drives and solid state circuit breakers.



Package Types: Bare Die
PN's: CPM3-1200-0013A

Features

- 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

- Motor Drives
- Solid State Circuit Breakers
- Resonant topologies

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 $R_{th(j-c)} < 0.28$ K/W	I_D	$T_c = 25^\circ C$	149
		$T_c = 100^\circ C$	102
Pulsed Drain Current, t_p limited by $T_{vj(max)}$	$I_D(pulse)$	300	A
Virtual Junction and Storage Temperature	T_{VJ}, T_{stg}	-55 to 175	$^\circ C$
Maximum Processing Temperature, in non-reactive ambient	T_{proc}	325	$^\circ C$

Recommended Operating Conditions

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

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

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Breakdown Voltage	$V_{(BR)DS}$	1200			V	$V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$
Gate Threshold Voltage	$V_{GS(th)}$	1.8	2.5	3.6	V	$V_{DS} = V_{GS}, I_{DS} = 27.9\ \text{mA}$
			2		V	$V_{DS} = V_{GS}, I_{DS} = 27.9\ \text{mA}, T_{VJ} = 175^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}		1	40	μA	$V_{DS} = 1200\ \text{V}, V_{GS} = 0\ \text{V}$
Gate-Source Leakage Current	I_{GSS}		10	250	nA	$V_{GS} = 15\ \text{V}, V_{DS} = 0\ \text{V}$
Drain-Source On-State Resistance	$R_{DS(on)}$	9	13	17	m Ω	$V_{GS} = 15\ \text{V}, I_D = 100\ \text{A}$
			21			$V_{GS} = 15\ \text{V}, I_D = 100\ \text{A}, T_{VJ} = 175^\circ\text{C}$
Transconductance	g_{fs}		71		S	$V_{DS} = 20\ \text{V}, I_{DS} = 100\ \text{A}$
			72			$V_{DS} = 20\ \text{V}, I_{DS} = 100\ \text{A}, T_{VJ} = 175^\circ\text{C}$
Input Capacitance	C_{iss}		7560		pF	$V_{GS} = 0\ \text{V}, V_{DS} = 1000\ \text{V}$ $f = 100\ \text{kHz}$ $V_{AC} = 25\ \text{mV}$
Output Capacitance	C_{oss}		284			
Reverse Transfer Capacitance	C_{rss}		18			
C_{oss} Stored Energy	E_{oss}		161		μJ	$V_{DS} = 1000\ \text{V}, f = 100\ \text{kHz}$
Internal Gate Resistance	$R_{G(int)}$		6.7		Ω	$f = 1\ \text{MHz}, V_{AC} = 25\ \text{mV}$
Gate to Source Charge	Q_{gs}		77		nC	$V_{DS} = 800\ \text{V}, V_{GS} = -4\ \text{V}/15\ \text{V}$ $I_{DS} = 100\ \text{A}$
Gate to Drain Charge	Q_{gd}		95			
Total Gate Charge	Q_g		260			

Reverse Diode Characteristics ($T_{VJ} = 25^\circ\text{C}$)

Characteristics	Symbol	Typ.	Max.	Unit	Test Conditions
Diode Forward Voltage	V_{SD}	4.6		V	$V_{GS} = -4\ \text{V}, I_{SD} = 50\ \text{A}$
		4.2		V	$V_{GS} = -4\ \text{V}, I_{SD} = 50\ \text{A}, T_{VJ} = 175^\circ\text{C}$
Reverse Recovery Time	t_{rr}	43		ns	$V_{GS} = -4\ \text{V}, I_{SD} = 100\ \text{A}, V_R = 800\ \text{V}$ $dif/dt = 3000\ \text{A}/\mu\text{s}, T_{VJ} = 175^\circ\text{C}$
Reverse Recovery Charge	Q_{rr}	1800		nC	
Peak Reverse Recovery Current	I_{rrm}	65		A	



Typical Performance

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

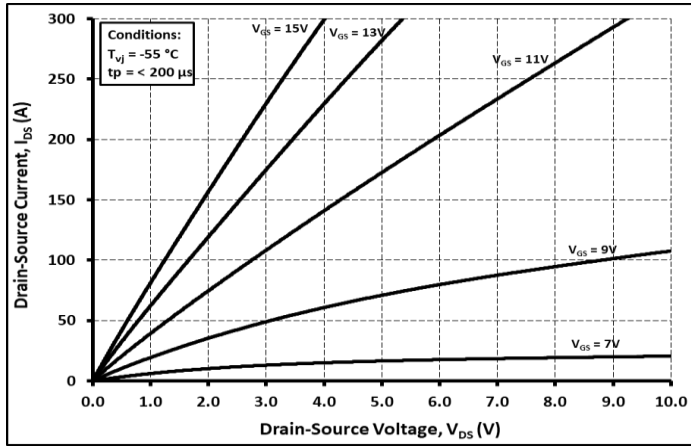


Figure 1.

Output Characteristics $T_{vj} = -55\text{ }^{\circ}\text{C}$

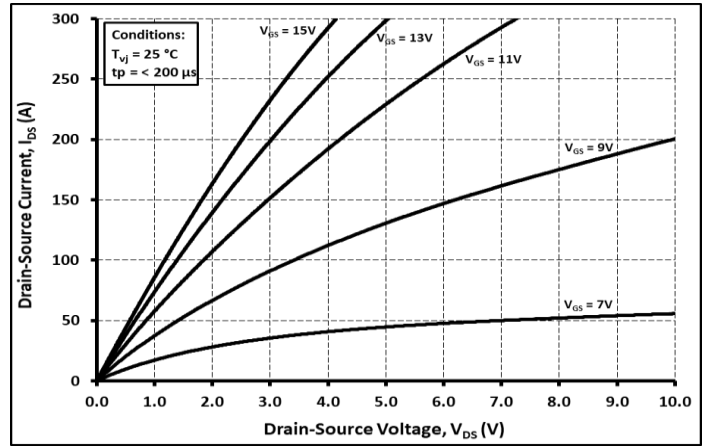


Figure 2.

Output Characteristics $T_{vj} = 25\text{ }^{\circ}\text{C}$

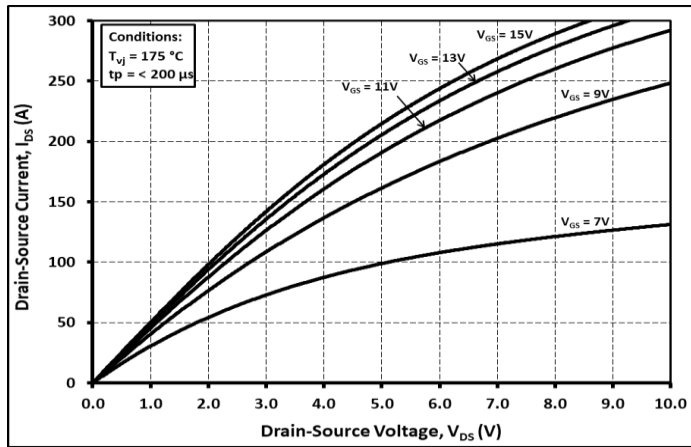


Figure 3.

Output Characteristics $T_{vj} = 175\text{ }^{\circ}\text{C}$

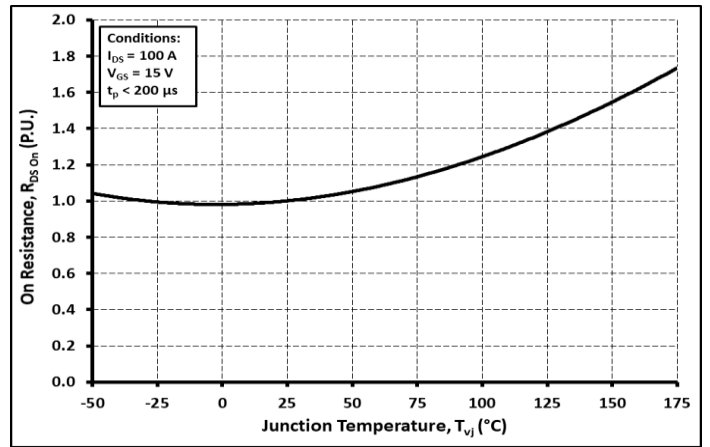


Figure 4.

Normalized On-Resistance vs. Temperature

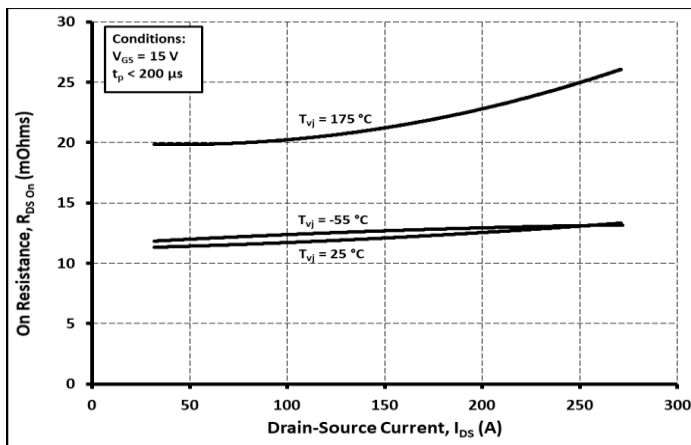


Figure 5.

On-Resistance vs. Drain Current For Various Temperatures

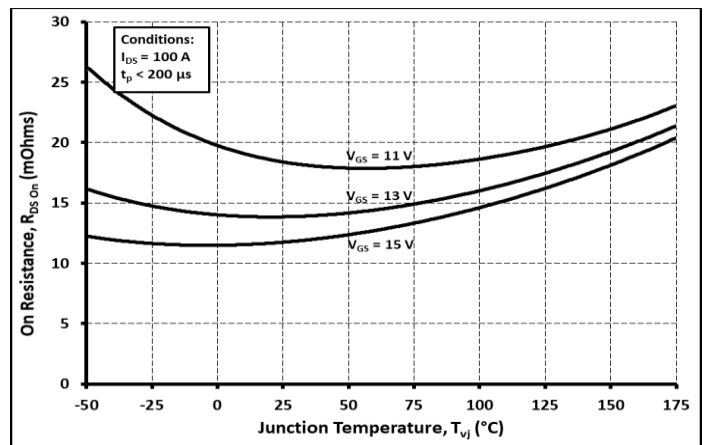


Figure 6.

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.

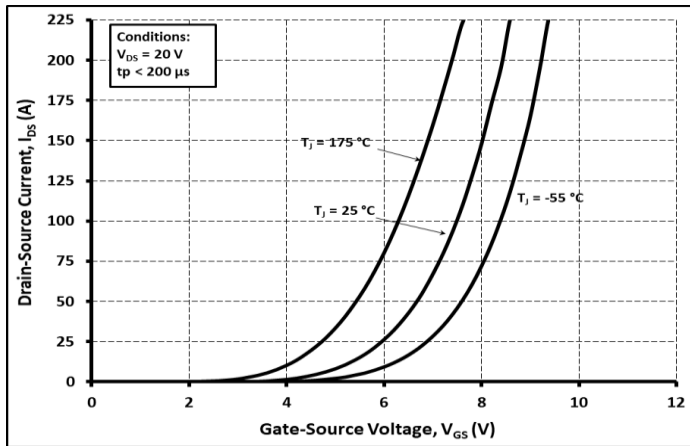


Figure 7.

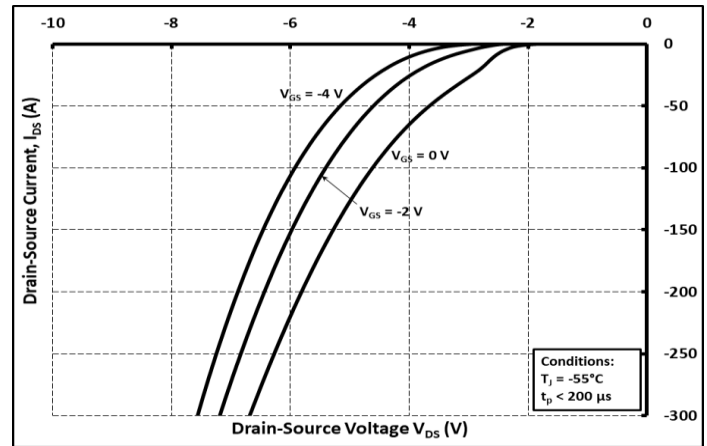


Figure 8.

Transfer Characteristic For Various Junction Temperatures

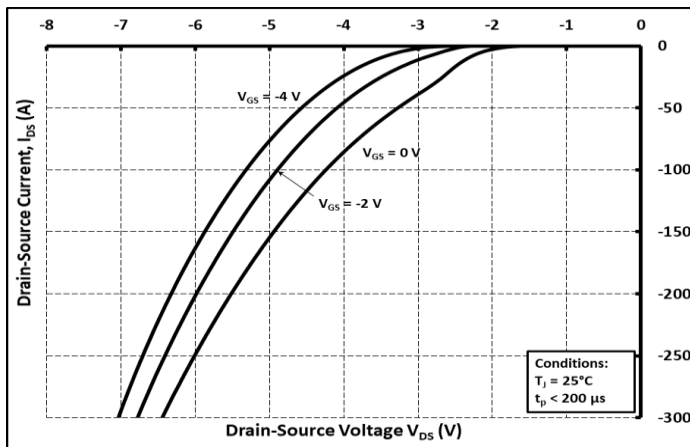


Figure 9.

Body Diode Characteristic at $T_{vj} = -55\text{ }^{\circ}\text{C}$

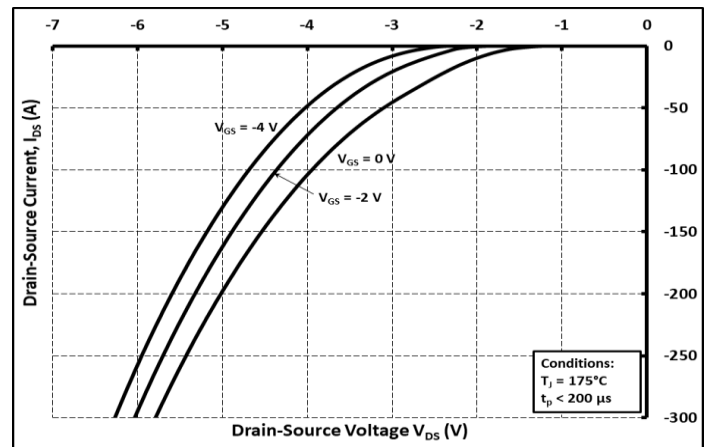


Figure 10.

Body Diode Characteristic at $T_{vj} = 25\text{ }^{\circ}\text{C}$

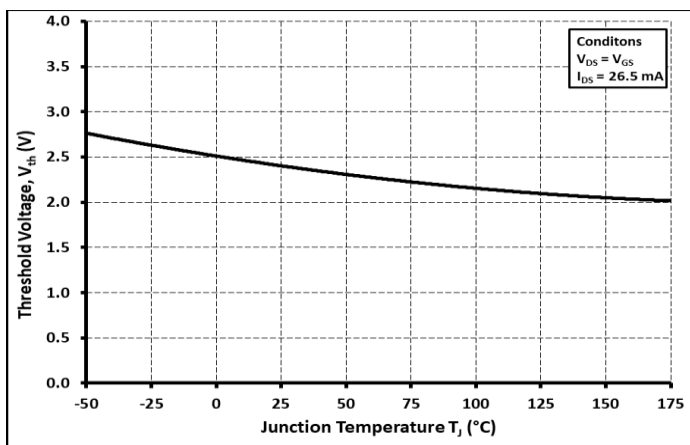


Figure 11.

Body Diode Characteristic at $T_{vj} = 175\text{ }^{\circ}\text{C}$

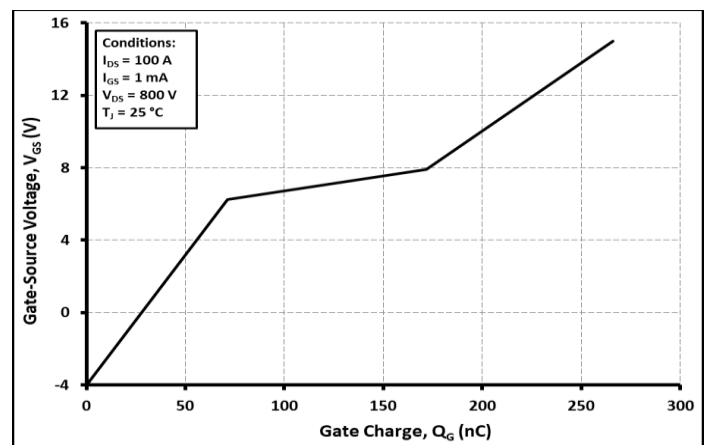


Figure 12.

Threshold Voltage vs. Temperature

Gate Charge Characteristics



Typical Performance

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

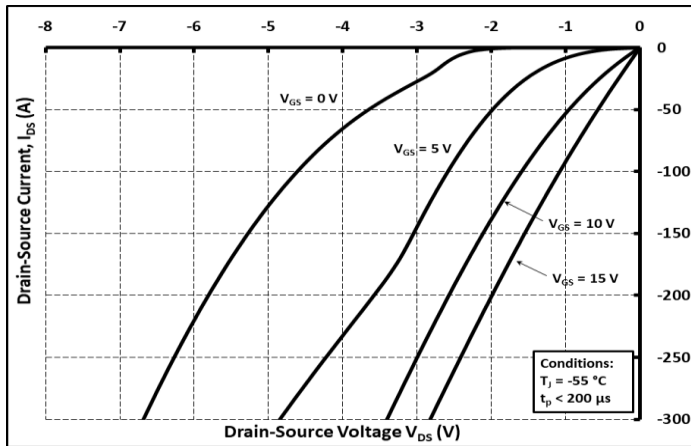


Figure 13.

3rd Quadrant Characteristic at $T_{vj} = -55\text{ }^{\circ}\text{C}$

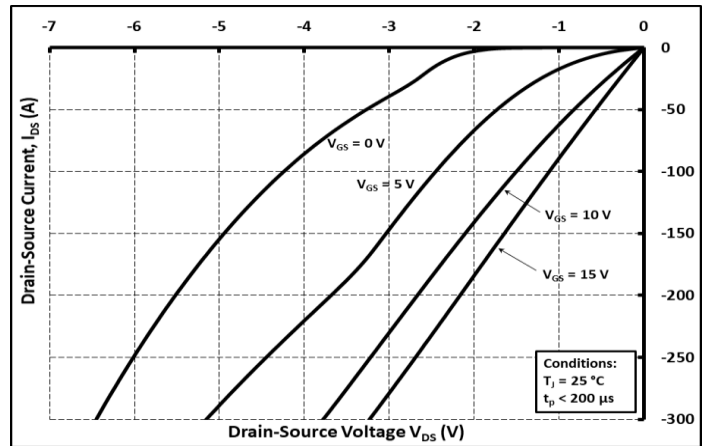


Figure 14.

3rd Quadrant Characteristic at $T_{vj} = 25\text{ }^{\circ}\text{C}$

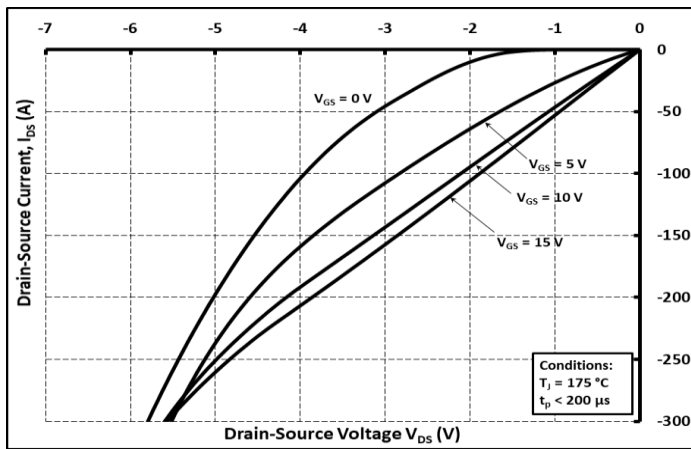


Figure 15.

3rd Quadrant Characteristic at $T_{vj} = 175\text{ }^{\circ}\text{C}$

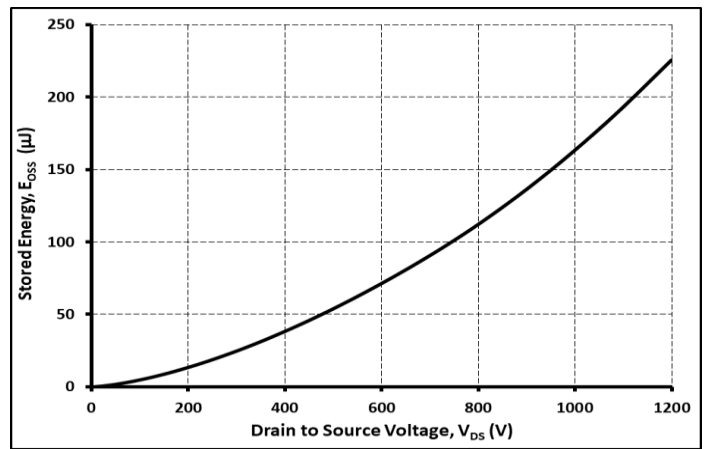


Figure 16.

Output Capacitor Stored Energy

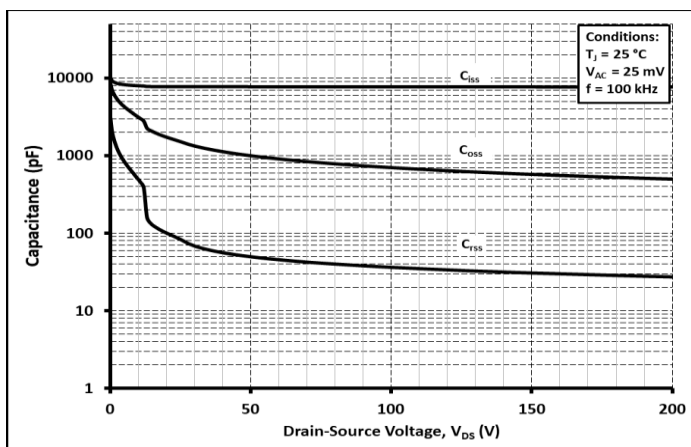


Figure 17.

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

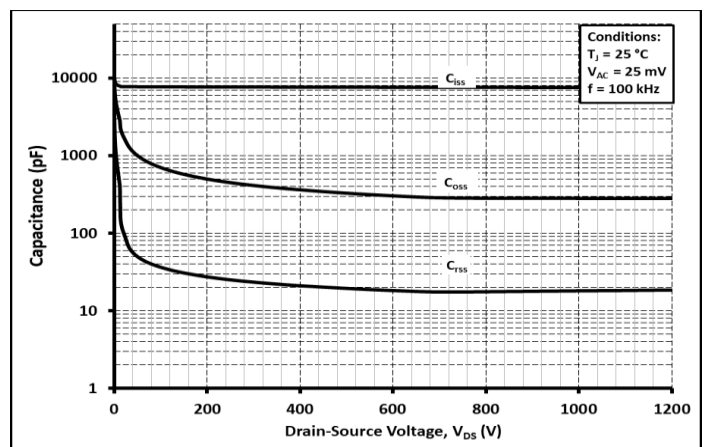


Figure 18.

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



Product Ordering Information

Order Number	Description	Package
CPM3-1200-0013A-FY6	SIC MOSFET G3 IND 1200V/13mO UV MLT	Bare Die Product
CPM3-1200-0013A-GQ8	SIC MOSFET G3 IND 1200V/13mO UV MVF	Bare Die Product

Revision History

Revision History	Date of Change	Brief Summary
-	04/02/2019	Initial Release
1	12/4/2019	<ul style="list-style-type: none"> Removed test conditions and note section from the Maximum Ratings Table Updated description for all the parameters in the Maximum Ratings Table Updated footnotes Temperature note removed and embedded into every test condition 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 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 All junction temperatures changed to virtual junction temperatures
2	02/24/2020	<ul style="list-style-type: none"> Footnotes updated Mechanical parameters corrected All graphs updated to reflect the most recent test data
3	7/30/2023	<ul style="list-style-type: none"> Document format updated



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