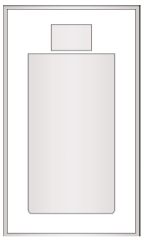
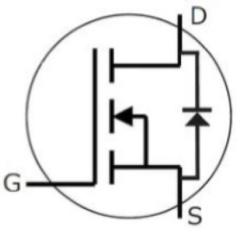
CPM3-1200-0160A

Wolfspeed SiC Gen 3 MOSFET

Description

This is 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 applications in renewable energy, high voltage DC-DC converter, power supplies and UPS.





G - Gate
S - Source
D - Drain

Package Types: Bare Die
PN: CPM3-1200-0160A

Features

- Enhanced 3rd Generation SiC MOSFET
- High blocking voltage with low on-resistance
- Easy to parallel and simple to drive
- Resistant to latch-up

Applications

- HVAC motor drive
- Renewable energy
- High voltage DC-DC converter
- Switch mode power supplies
- UPS

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 typical $R_{th(j-c)}$ = 1.29K/W	I_D	T_c = 25°C	17	A
		T_c = 100°C	12	
Pulsed Drain Current, t_p limited by $T_{vj(max)}$	$I_{D(pulse)}$		34	A
Virtual Junction and Storage Temperature	T_{VJ}, T_{stg}		-55 to +150	°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 unless otherwise specified)

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	1200			V	V_{GS} =0 V, I_{DS} =100 µA
Gate Threshold Voltage	$V_{GS(th)}$	1.8	2.8	3.6	V	V_{DS} = V_{GS}, I_{DS} = 2.33 mA
			2.2		V	V_{DS} = V_{GS}, I_{DS} = 2.33 mA, T_{VJ} = 150°C
Zero Gate Voltage Drain Current	I_{DSS}		1	6	µA	V_{DS} = 1200V, V_{GS} = 0 V
Gate-Source Leakage Current	I_{GSS}		10	17	nA	V_{GS} = 15 V, V_{DS} = 0 V
Drain-Source On-State Resistance	$R_{DS(on)}$	112	160	208	mΩ	V_{GS} = 15 V, I_{DS} = 8.5 A
			256			V_{GS} = 15 V, I_{DS} = 8.5 A, T_{VJ} = 150°C
Transconductance	g_{fs}		5.2		S	V_{DS} = 20 V, I_{DS} = 8.5 A
			4.9			V_{DS} = 20 V, I_{DS} = 8.5 A, T_{VJ} = 150°C
Input Capacitance	C_{iss}		632		pF	V_{GS} = 0 V, V_{DS} = 1000V f = 1 MHz V_{AC} = 25mV
Output Capacitance	C_{oss}		39			
Reverse Transfer Capacitance	C_{rss}		3			
C_{oss} Stored Energy	E_{oss}		22.5		µJ	V_{DS} = 1200 V, f = 1 MHz
Internal Gate Resistance	$R_{G(int)}$		8		Ω	f = 1 MHz, V_{AC} = 25mV
Gate to Source Charge	Q_{gs}		9		nC	V_{DS} = 800 V, V_{GS} = -4 V/15 V I_{DS} = 8.5 A
Gate to Drain Charge	Q_{gd}		12			
Total Gate Charge	Q_g		38			

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

Characteristics	Symbol	Typ.	Max.	Unit	Test Conditions
Diode Forward Voltage	V_{SD}	4.5		V	V_{GS} = -4 V, I_{SD} = 3 A
		4.0		V	V_{GS} = -4 V, I_{SD} = 3 A, T_{VJ} = 150 °C
Reverse Recovery Time	t_{rr}	34		ns	V_{GS} = -4 V, I_{SD} = 8.5 A, V_R = 800 V dI_f/d_t = 844 A/µs, T_{VJ} = 150 °C
Reverse Recovery Charge	Q_{rr}	194		nC	
Peak Reverse Recovery Current	I_{rrm}	8		A	

Typical Performance

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

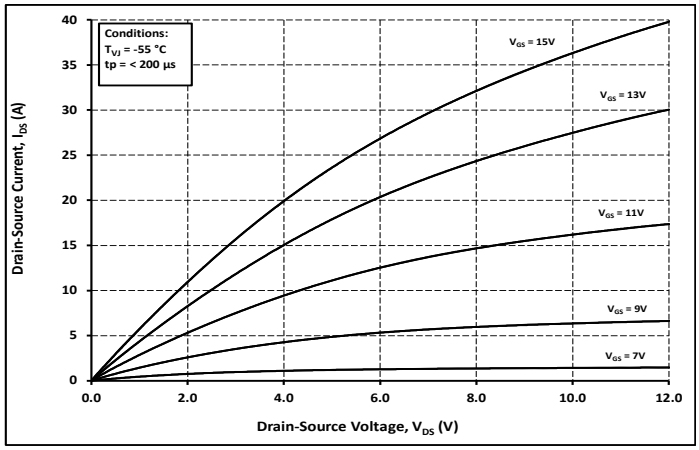


Figure 1.

Output Characteristics T_{vj} = -55 °C

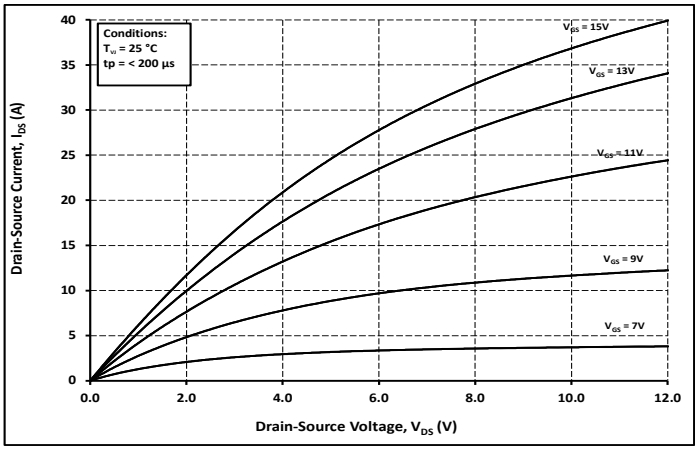


Figure 2.

Output Characteristics T_{vj} = 25 °C

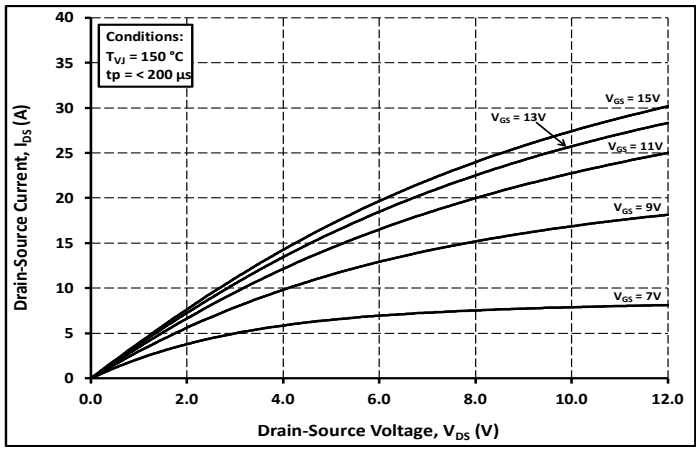


Figure 3.

Output Characteristics T_{vj} = 150 °C

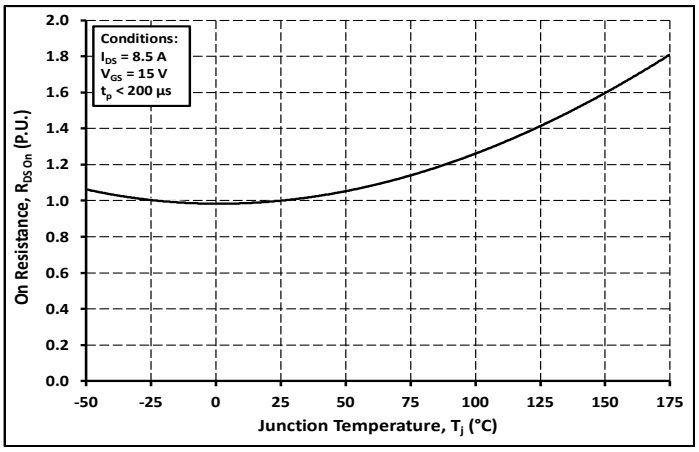


Figure 4.

Normalized On-Resistance vs. Temperature

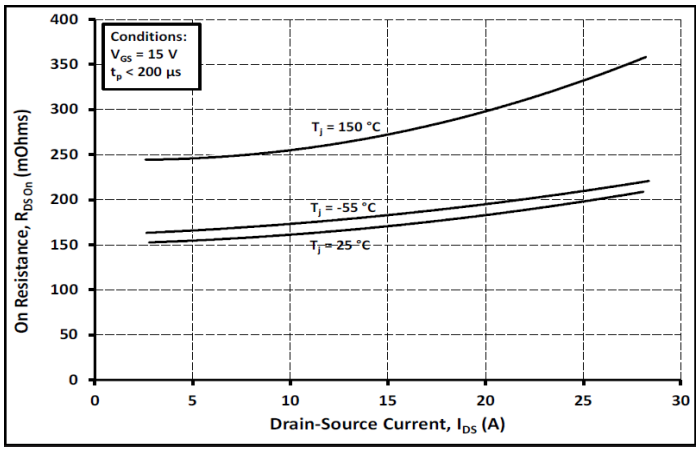


Figure 5.

On-Resistance vs. Drain Current For Various Temperatures

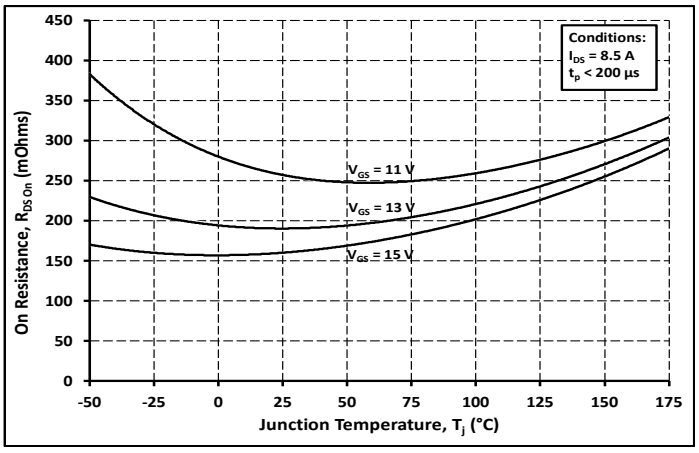


Figure 6.

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

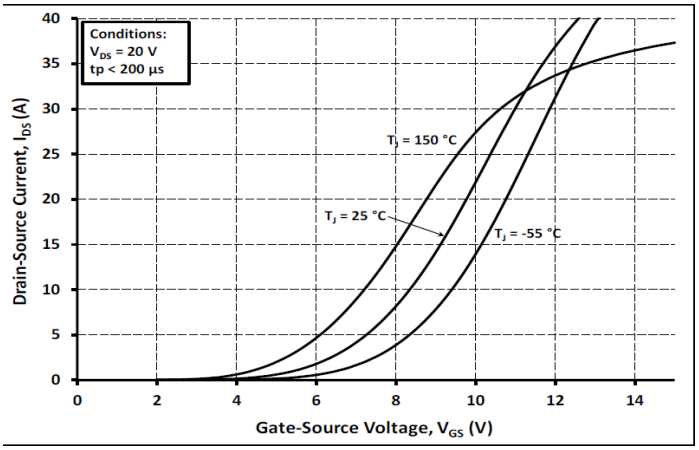


Figure 7.

Transfer Characteristic For Various Junction Temperatures

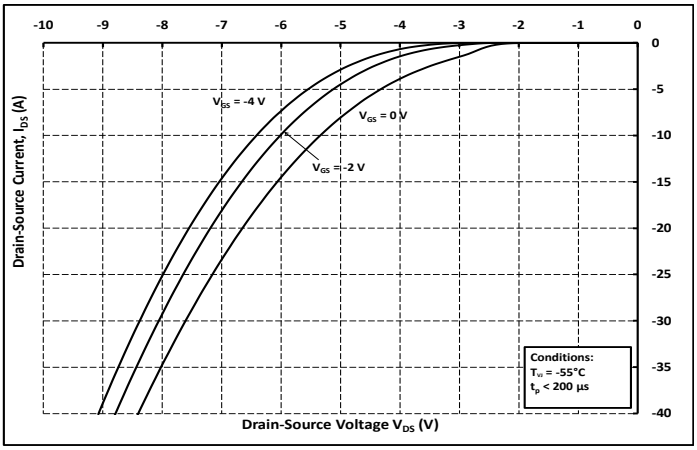


Figure 8.

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

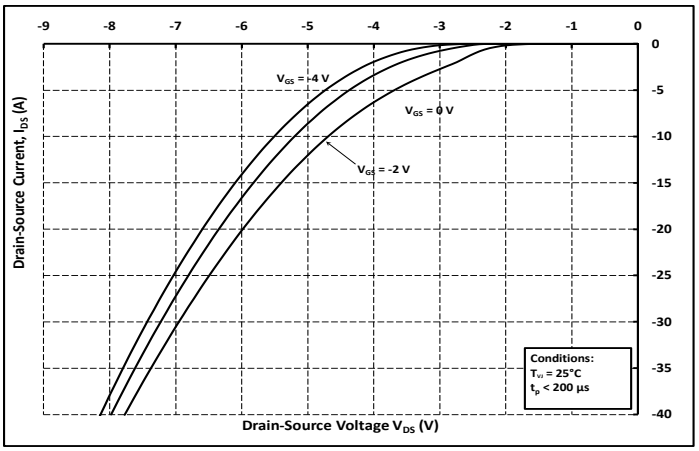


Figure 9.

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

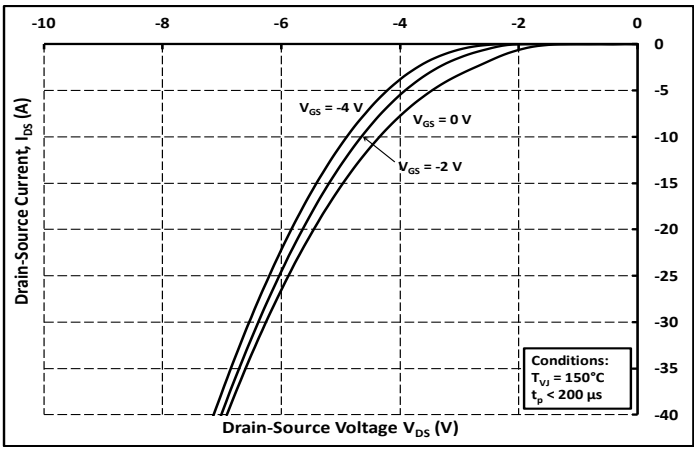


Figure 10.

Body Diode Characteristic at T_{vj} = 150 °C

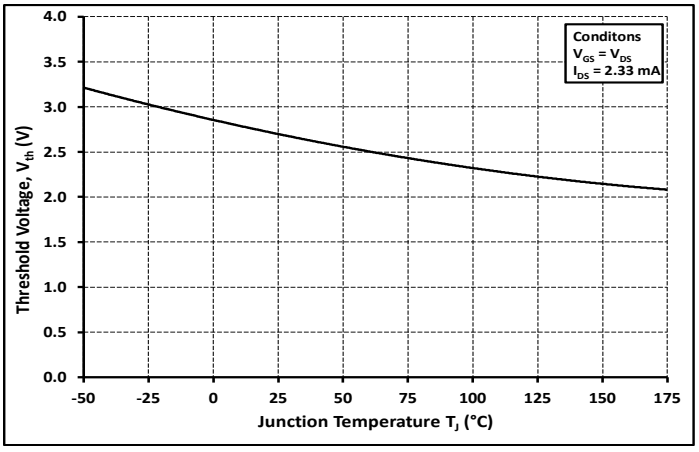


Figure 11.

Threshold Voltage vs. Temperature

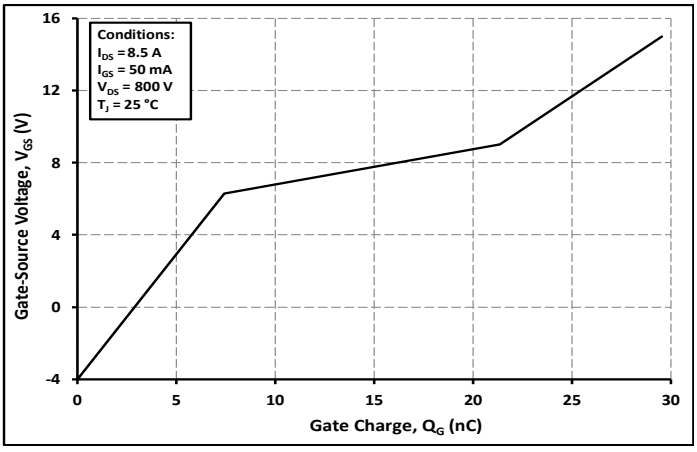


Figure 12.

Gate Charge Characteristics

Typical Performance

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

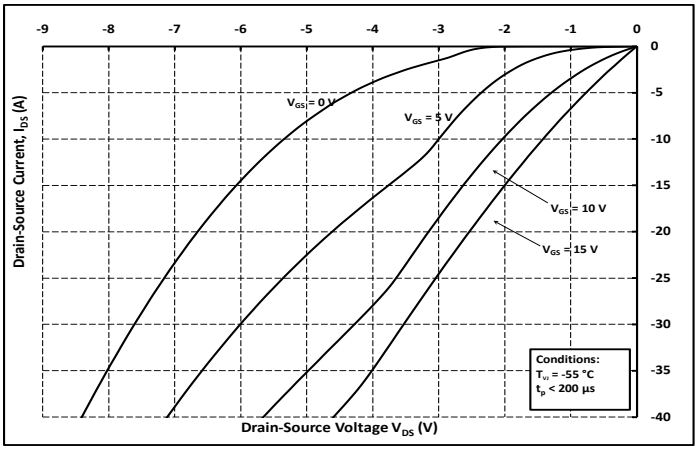


Figure 13.

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

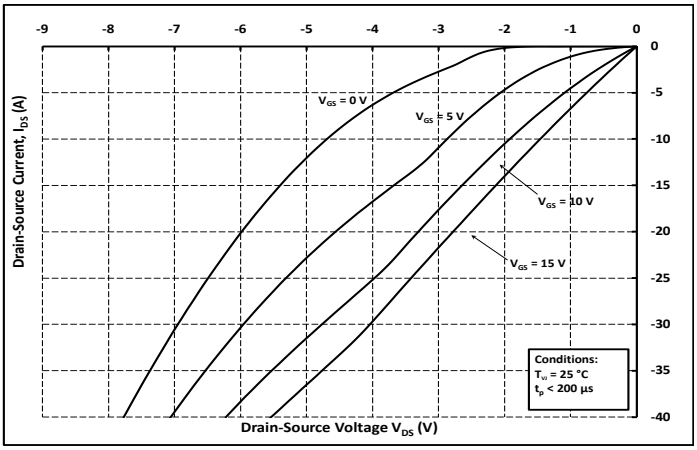


Figure 14.

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

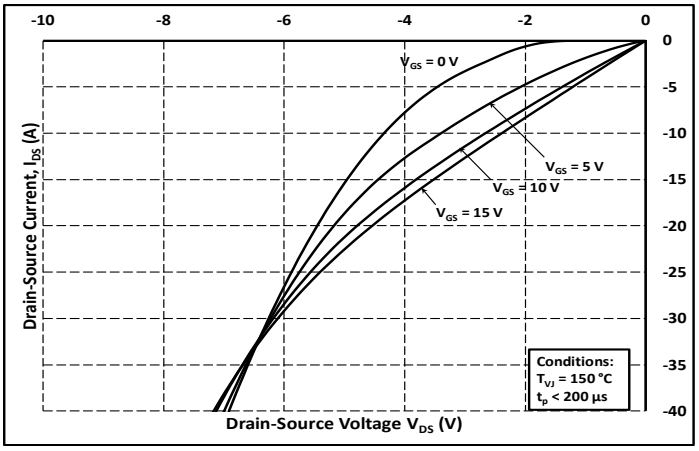


Figure 15.

3rd Quadrant Characteristic at T_{vj} = 150 °C

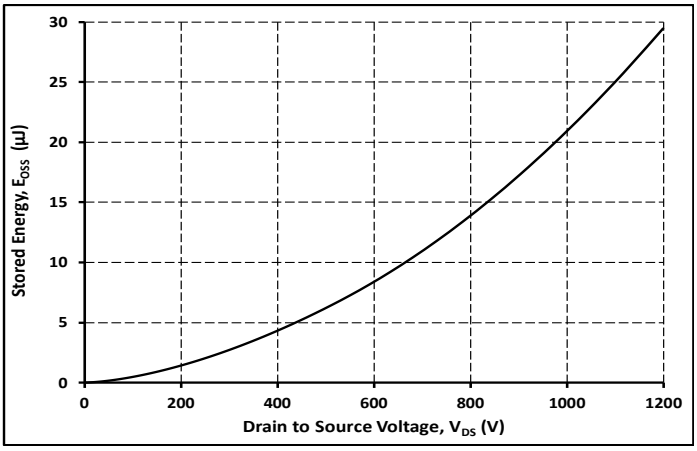


Figure 16.

Output Capacitor Stored Energy

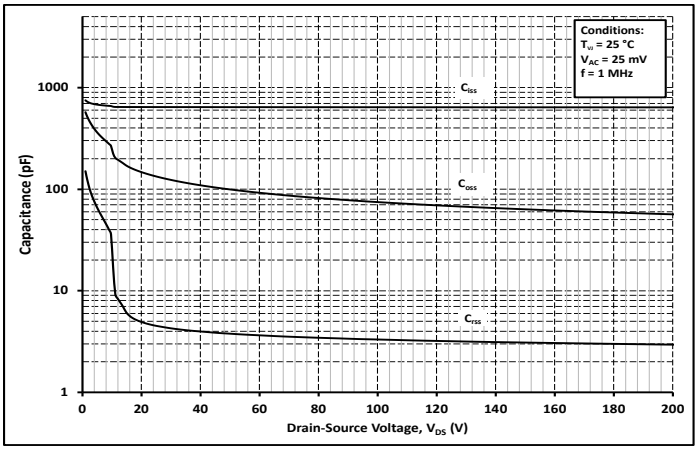


Figure 17.

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

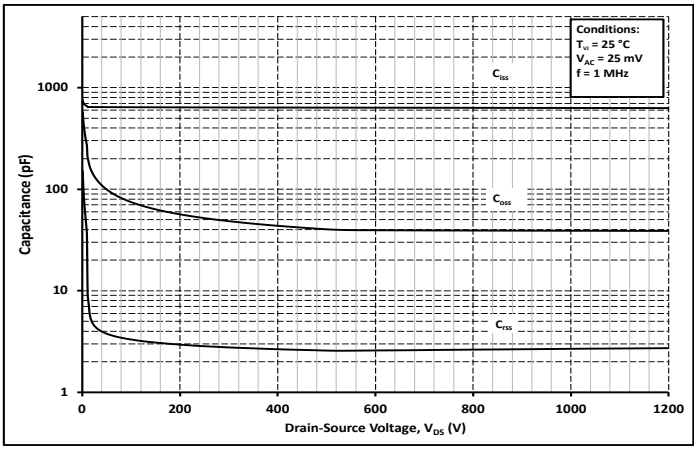
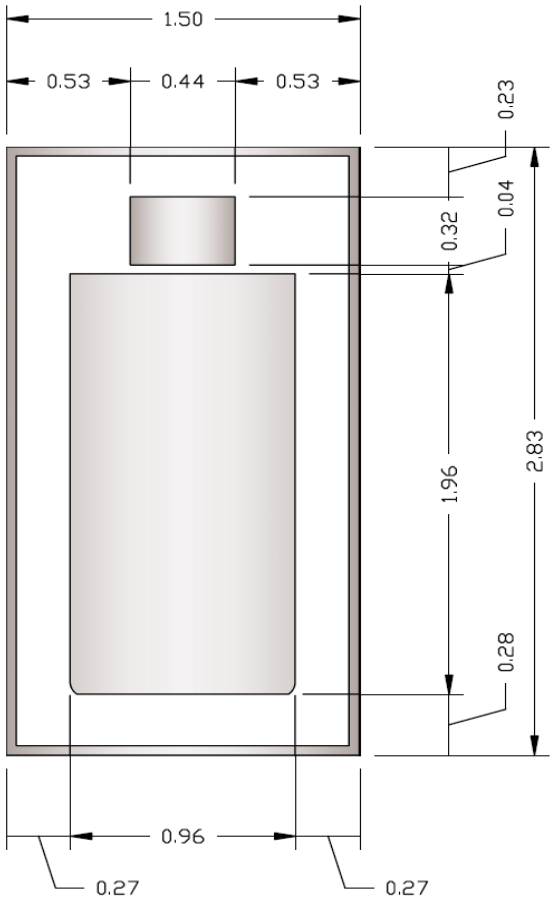


Figure 18.

Capacitances vs. Drain-Source Voltage (0-650V)

Product Dimensions CPM3-1200-0160A



Product Dimensions CPM3-1200-0160A

Parameter	Typical	Units
Die Size (L x W)	1.50 x 2.83	mm
Exposed Source Pad Metal Dimensions	1.96 x 0.96 (x1)	**mm**
Gate Pad Dimensions	0.44 x 0.32	**mm**
Chip Thickness[1]	180 ± 20	µm
Frontside (Source) metalization (Al)	4	µm
Frontside (Gate) metalization (Al)	4	µm
Backside (Drain) metalization (Ni:Au)	0.8 / 0.1	µm

[1]SiC wafer thickness

Product Ordering Information

Order Number	Description	Package
CPM3-1200-0160A-FY6	1200V/160mΩ SiC MOSFET G3 IND UV MUL	Bare Die Product

Revision History

Revision History	Date of Change	Brief Summary
1	07/27/2022	Initial Release.

Notes & Disclaimer

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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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