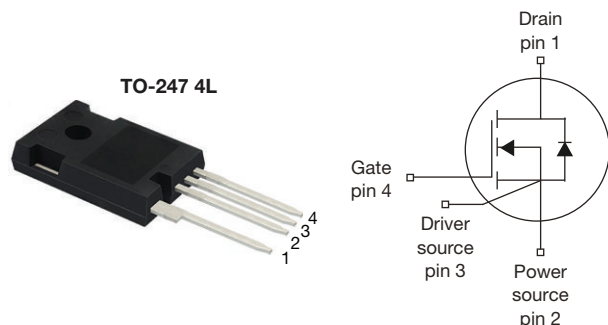


MaxSiC™ 1200 V N-Channel SiC MOSFET



Marking Code: 120A250FL

PRODUCT SUMMARY		
V_{DS} (V) at T_J max.	1200	
$R_{DS(on)}$ typ. (mΩ) at 25 °C	$V_{GS} = 20$ V	250
Q_g typ. (nC)	20	
I_D (A)	10.5	
C_{oss} (pF)	21.2	
P_D (W)	56	
Configuration	Single	

ORDERING INFORMATION	
Package	TO-247 4L
Lead (Pb)-free and halogen-free	MXP120A250FL-Y-GE3

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage ^a		V_{DS}	1200	V
Gate-source voltage		V_{GS}	-10 / +22	
Continuous drain current	$T_C = 25$ °C	I_D	10.5	A
	$T_C = 100$ °C	I_D	6.7	
Pulsed drain current ^b		I_{DM}	21	
Short-circuit withstand time		T_{SC}	3	μs
Maximum power dissipation	$T_C = 25$ °C	P_D	56	W
	$T_C = 100$ °C	P_D	22	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +150	°C

Notes

a. $T_J = 25$ °C to 150 °C

b. Repetitive rating; pulse width limited by maximum junction temperature

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

FEATURES

- Fast switching speed
- Short circuit withstand time 3 μs
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- Charger
- Industrial UPS
- Boost inverter
- DC/DC converter



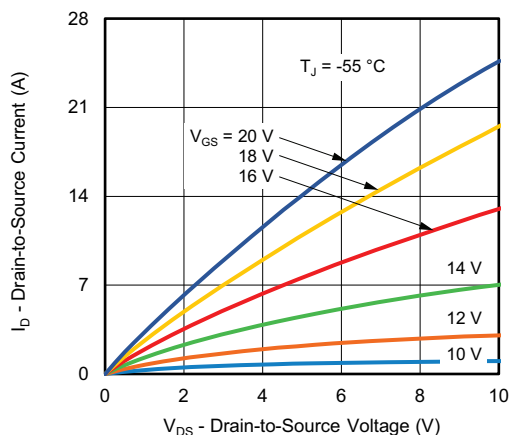
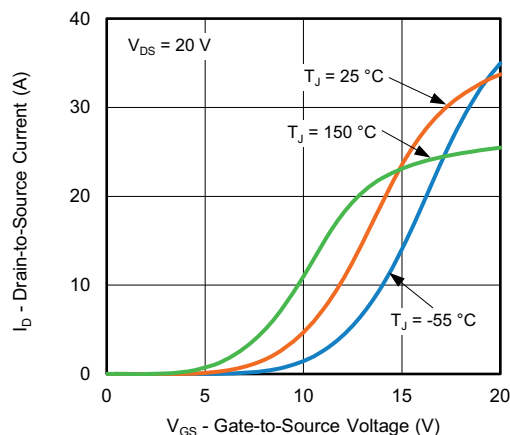
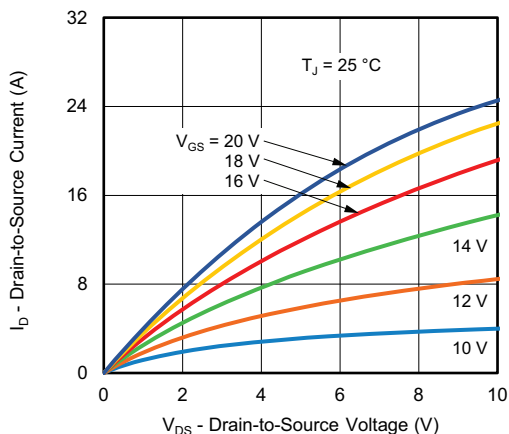
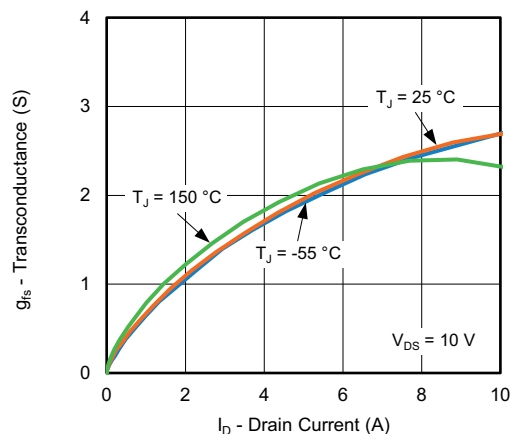
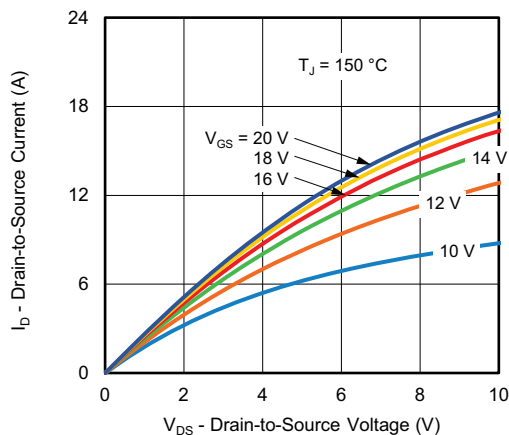
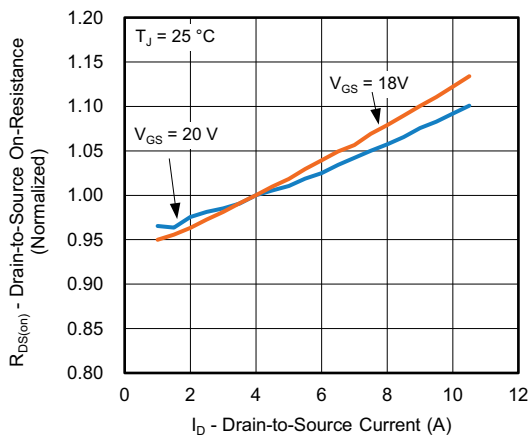
RoHS
COMPLIANT
HALOGEN
FREE

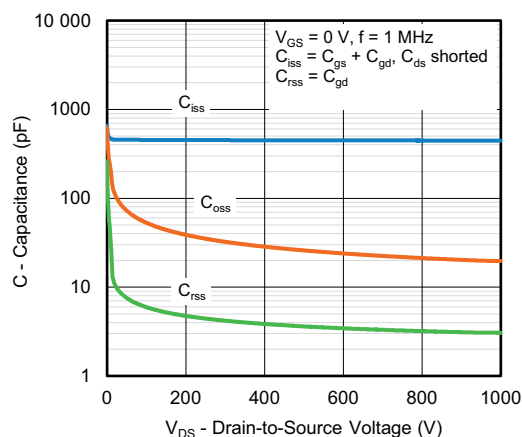
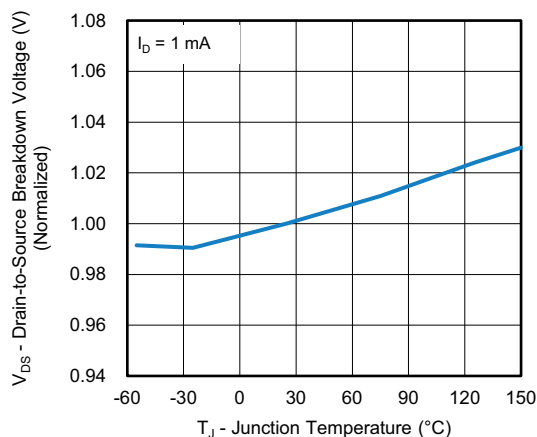
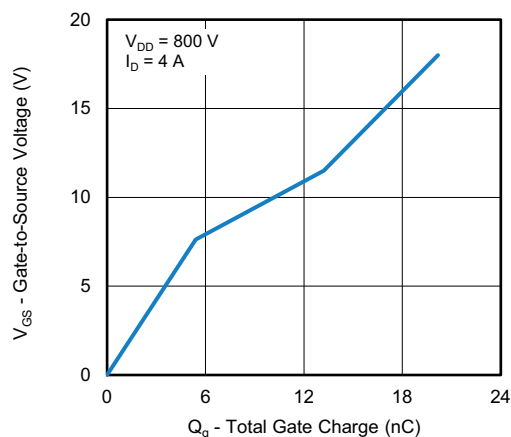
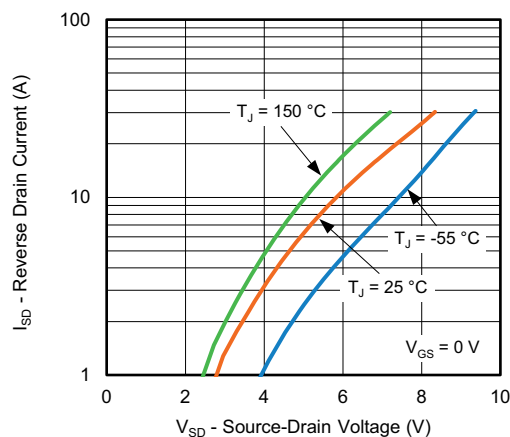
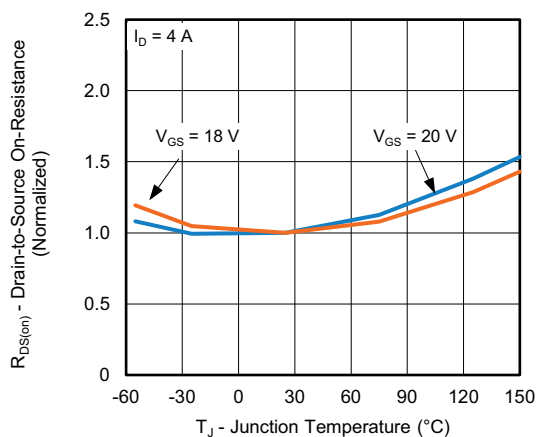
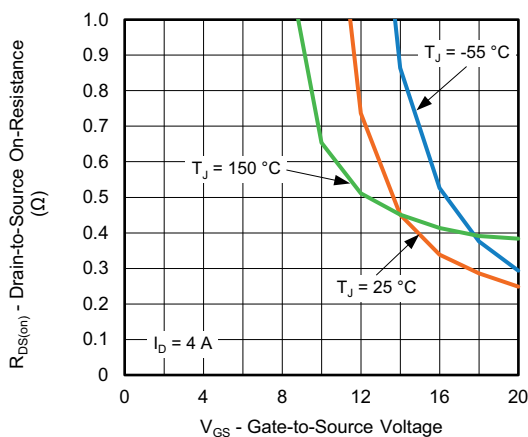
**THERMAL RESISTANCE RATINGS**

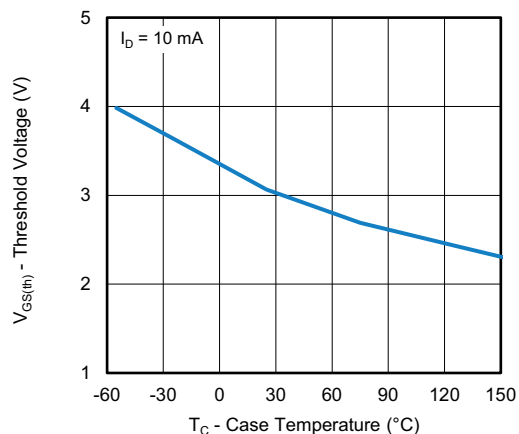
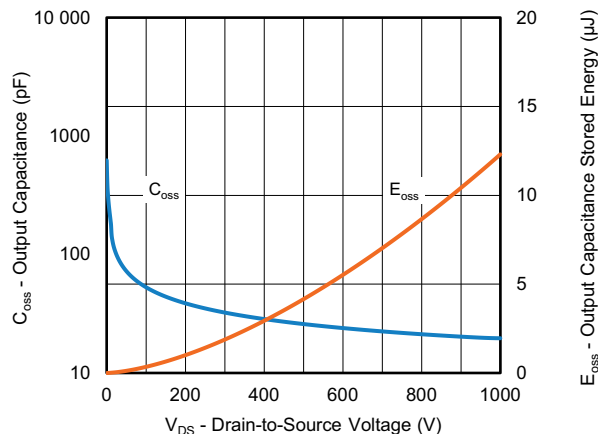
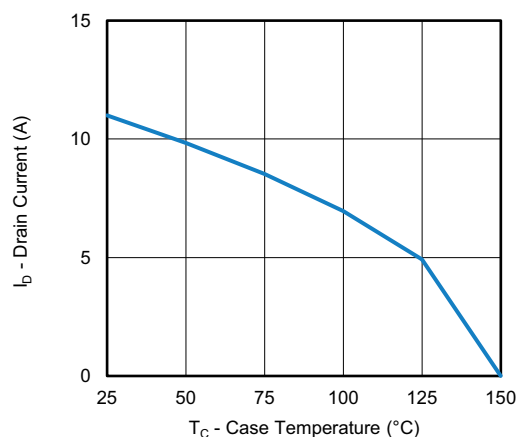
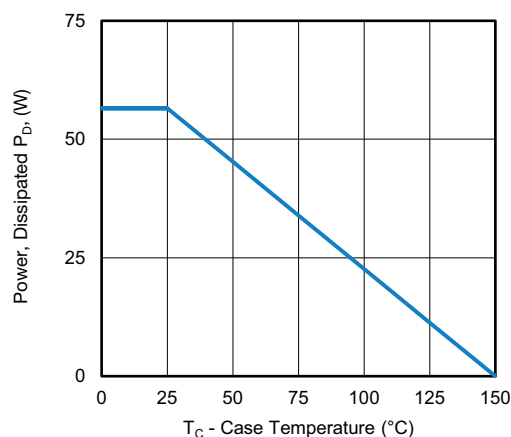
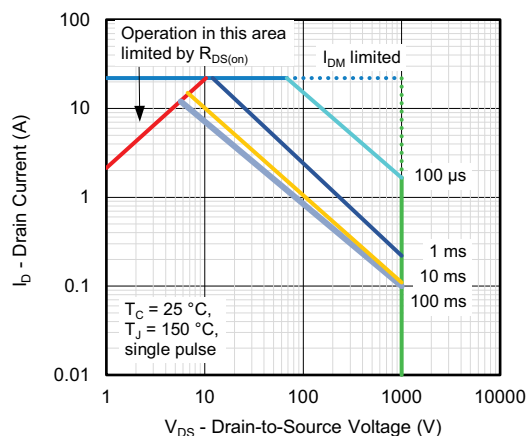
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum junction-to-ambient	R_{thJA}	-	40	°C/W
Maximum junction-to-case (drain)	R_{thJC}	-	2.24	

SPECIFICATIONS ($T_J = 25\text{ °C}$, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0 V, I _D = 1 mA		1200	-	-	V
Gate-source threshold voltage (N)	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 10 mA		-	3.1	-	V
		V _{DS} = V _{GS} , I _D = 10 mA, T _J = 150 °C		-	2.3	-	V
Gate-source leakage	I _{GSS}	V _{GS} = +22 V, V _{DS} = 0 V		-	-	100	nA
		V _{GS} = -10 V, V _{DS} = 0 V		-	-	-100	
Zero gate voltage drain current	I _{DSS}	V _{DS} = 960 V, V _{GS} = 0 V		-	-	10	μA
Drain-source on-state resistance	R _{DS(on)}	V _{GS} = 20 V, I _D = 4 A		-	250	313	mΩ
		V _{GS} = 20 V, I _D = 4 A, T _J = 150 °C		-	380	475	
		V _{GS} = 18 V, I _D = 4 A		-	287	359	
		V _{GS} = 18 V, I _D = 4 A, T _J = 150 °C		-	395	494	
Dynamic							
Input capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 800 V, f = 1 MHz		-	447	-	pF
Output capacitance	C _{oss}			-	21.2	-	
Reverse transfer capacitance	C _{rss}			-	3.2	-	
Total gate charge	Q _g	V _{GS} = 18 V	I _D = 4 A, V _{DS} = 800 V	-	20.3	-	nC
Gate-source charge	Q _{gs}			-	5.5	-	
Gate-drain charge	Q _{gd}			-	7.9	-	
Gate Resistance	R _g	V _{DS} = 0 V, f = 1 MHz		-	34	-	Ω
Switching Characteristics							
Turn-on delay time	t _{d(on)}	V _{GS} = -5 V ~ 18 V, I _D = 4 A, V _{DS} = 800 V, R _{g(ext)} = 4.4 Ω		-	8.5	-	ns
Rise time	t _r			-	11.5	-	
Turn-off delay time	t _{d(off)}			-	8.5	-	
Fall time	t _f			-	14.5	-	
Turn-on switching energy	E _{on}			-	67	-	μJ
Turn-off switching energy	E _{off}			-	5	-	
Reverse Diode Characteristics							
Reverse recovery time	t _{rr}	V _{GS} = -5 V, I _{SD} = 4 A, V _R = 800 V, di/dt = 1000 A/μs		-	7.5	-	ns
Reverse recovery charge	Q _{rr}			-	12	-	nC
Reverse recovery current	I _{rrm}			-	2.8	-	A

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Fig. 1 - Typical Output Characteristics

Fig. 4 - Typical Transfer Characteristics

Fig. 2 - Typical Output Characteristics

Fig. 5 - Forward Transconductance vs. Drain Current

Fig. 3 - Typical Output Characteristics

Fig. 6 - Normalized On-Resistance vs. Drain-to-Source Current


Fig. 7 - Typical Capacitance vs. Drain-to-Source Voltage

Fig. 10 - Temperature vs. Drain-to-Source Voltage

Fig. 8 - Typical Gate Charge vs. Gate-to-Source Voltage

Fig. 11 - Typical Source-Drain Diode Forward Voltage

Fig. 9 - Normalized On-Resistance vs. Temperature

Fig. 12 - On-Resistance vs. Gate-to-Source Voltage


Fig. 13 - Threshold Voltage vs. Case Temperature

Fig. 15 - Output Capacitance and its Stored Energy vs. Drain-to-Source Voltage

Fig. 14 - Drain Current vs. Case Temperature

Fig. 16 - Power, Dissipated P_D vs. Case Temperature

Fig. 17 - Safe Operating Area

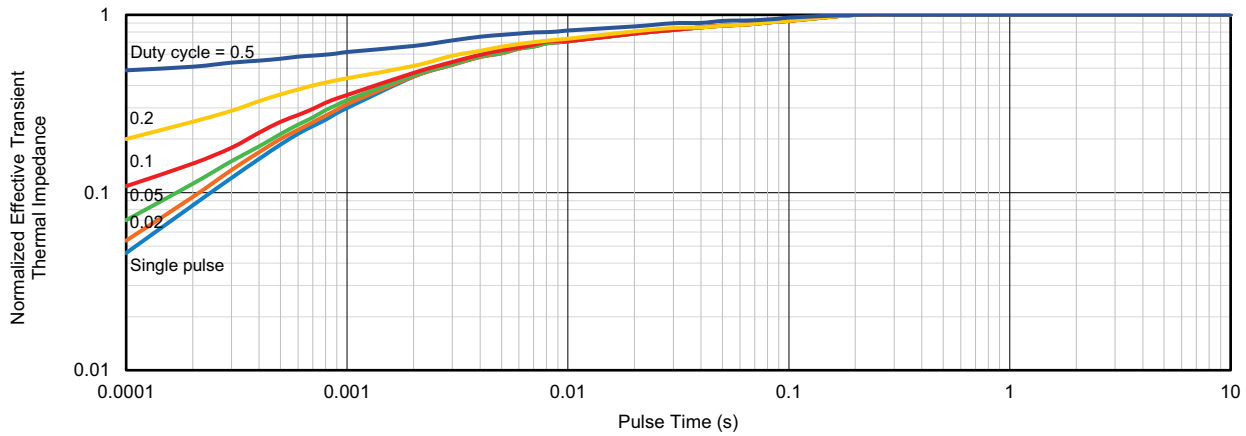
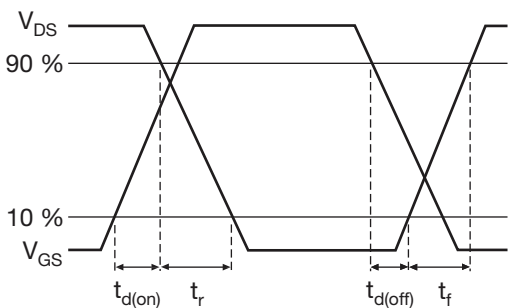
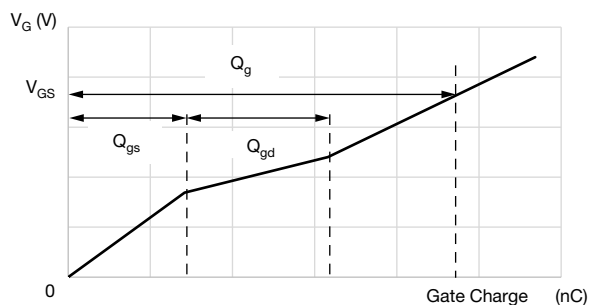
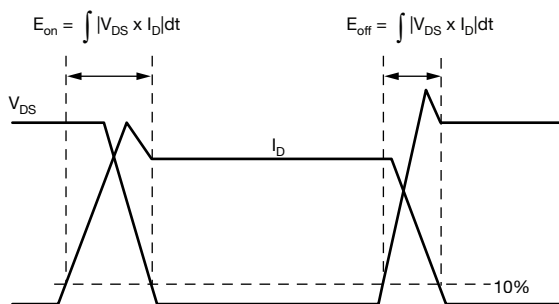
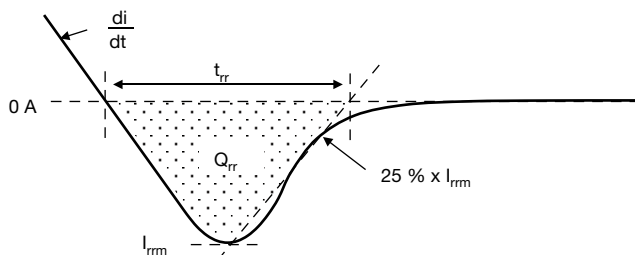
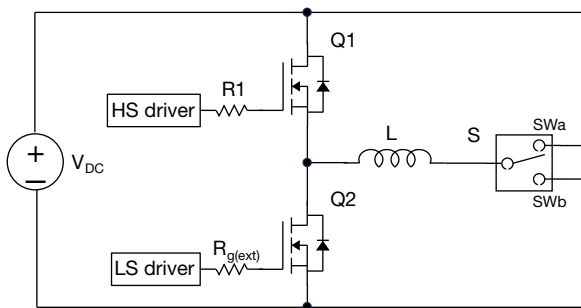


Fig. 18 - Normalized Effective Transient Thermal Impedance


Fig. 19 - Waveforms of Switching Time

Fig. 22 - Waveforms for Gate Charge

Fig. 20 - Waveforms for Switching Energy

Fig. 23 - Waveforms for Reverse Recovery

Fig. 21 - Switching and Reverse Diode Characteristics Measurement Circuit

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