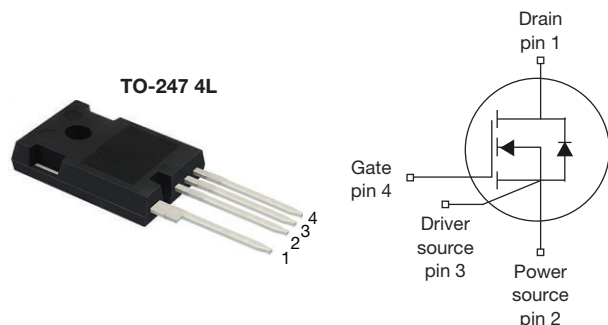


MaxSiC™ 1200 V N-Channel SiC MOSFET


Marking Code: 120A080FL

FEATURES

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


RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Charger
- Auxiliary motor drive
- DC/DC converter

PRODUCT SUMMARY

V_{DS} (V) at T_J max.	1200	
$R_{DS(on)}$ typ. ($m\Omega$) at 25 °C	$V_{GS} = 20$ V	80
Q_g typ. (nC)	47.3	
I_D (A)	29	
C_{oss} typ. (pF)	50	
P_D (W)	139	
Configuration	Single	

ORDERING INFORMATION

Package	TO-247 4L
Lead (Pb)-free and halogen-free	MXP120A080FL-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	A
	$T_C = 100$ °C	I_D	
Pulsed drain current ^b	I_{DM}	58	
Short-circuit withstand time	T_{SC}	3	μ s
Maximum power dissipation	$T_C = 25$ °C	P_D	W
	$T_C = 100$ °C	P_D	
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +150	°C
Soldering recommendations (peak temperature)	For 10 s	260	°C

Notes

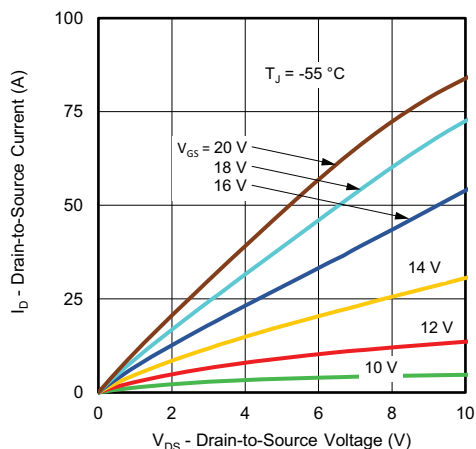
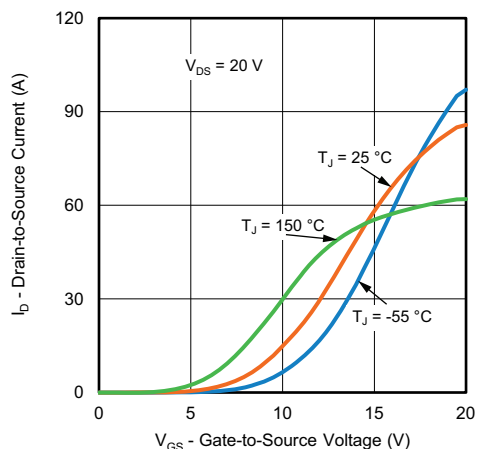
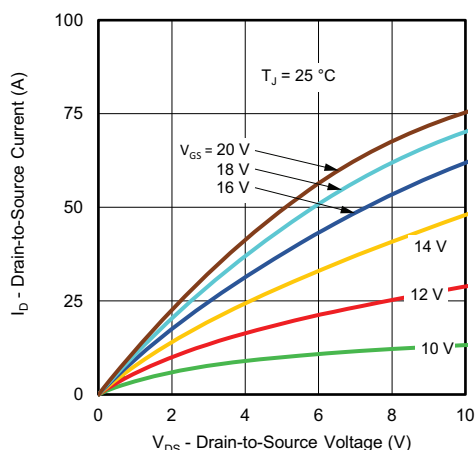
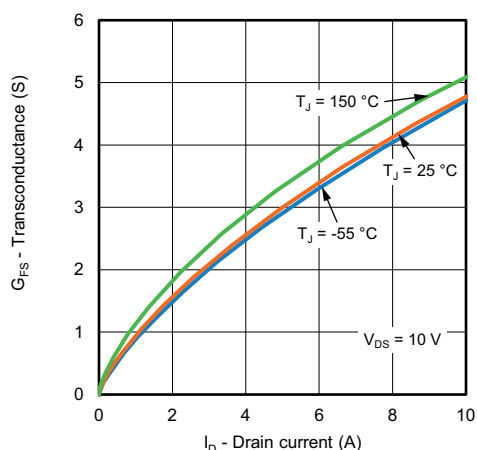
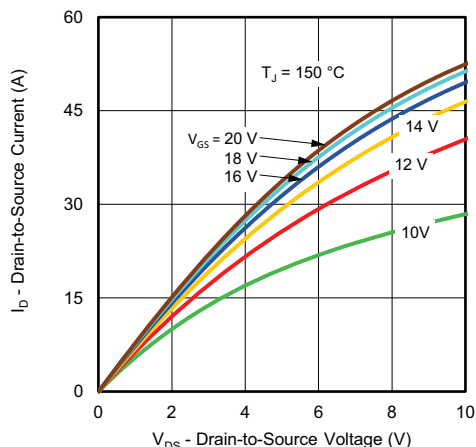
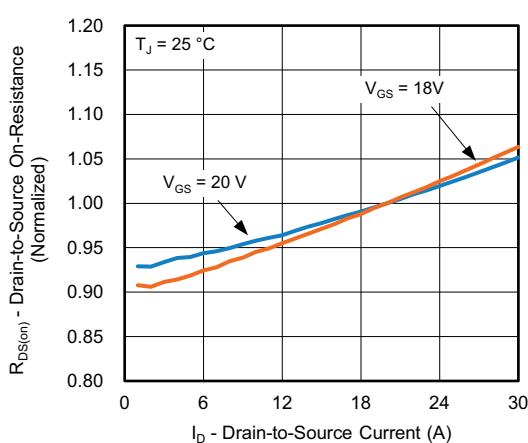
- a. $T_J = 25$ °C to 150 °C
b. Repetitive rating; pulse width limited by maximum junction temperature

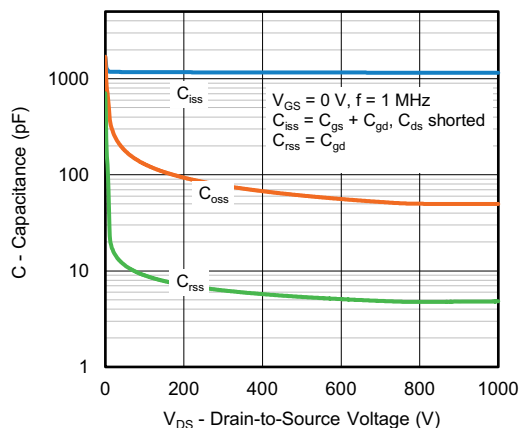
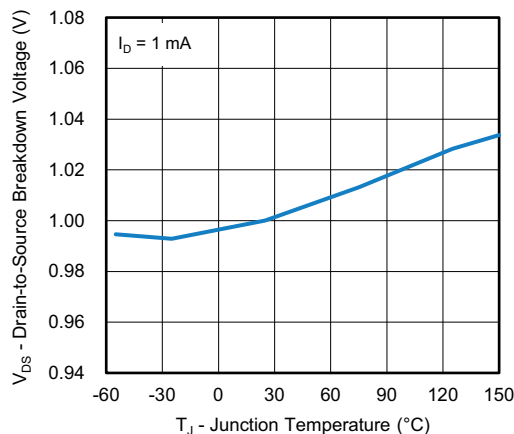
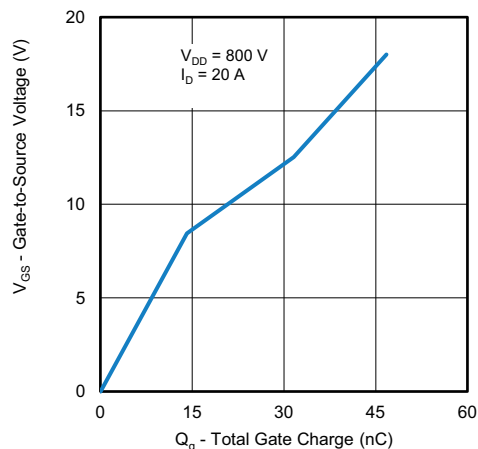
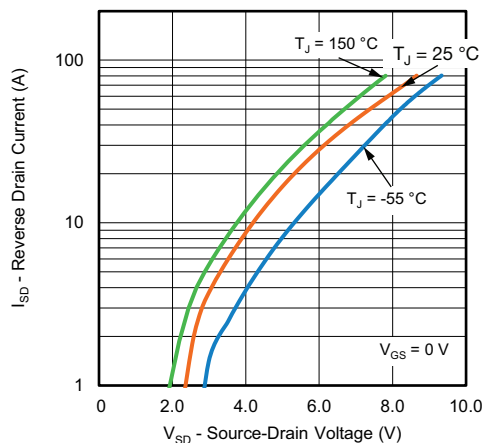
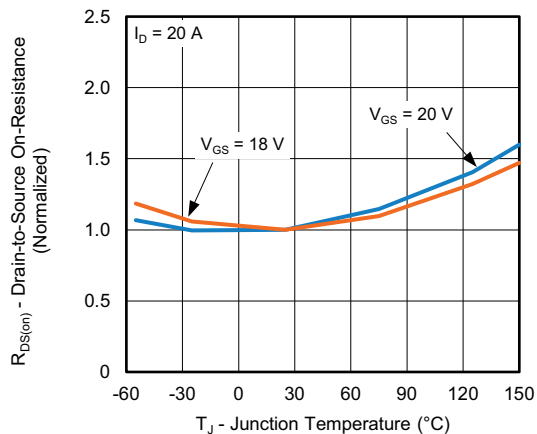
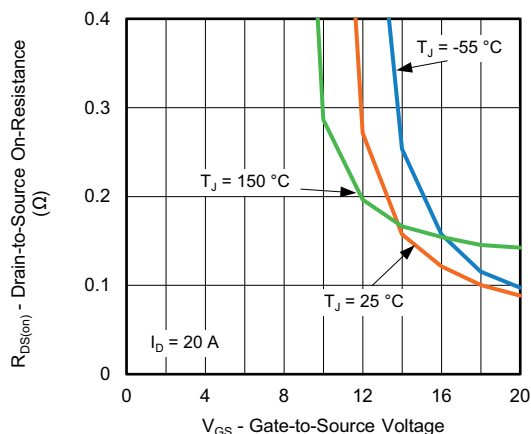
**THERMAL RESISTANCE RATINGS**

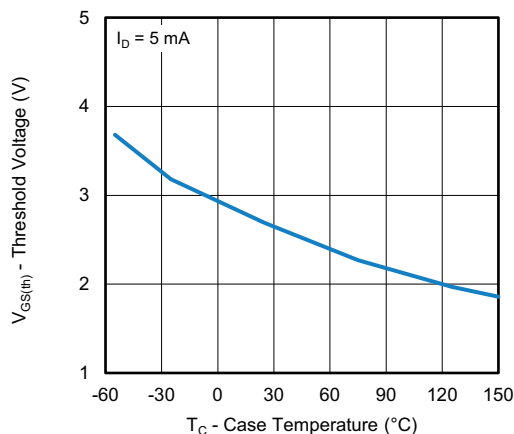
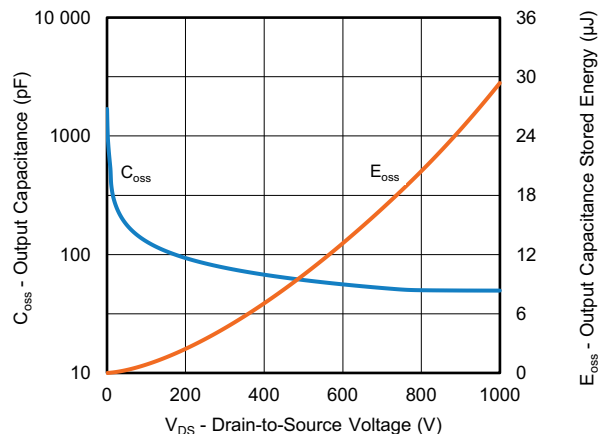
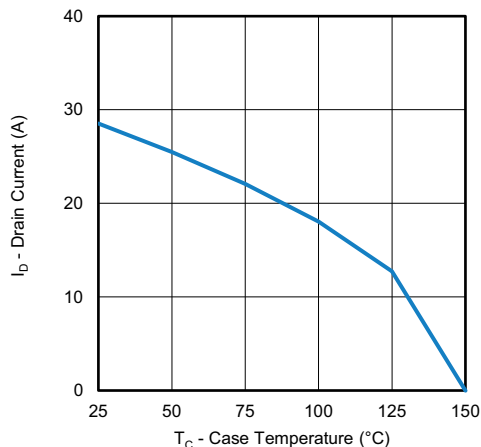
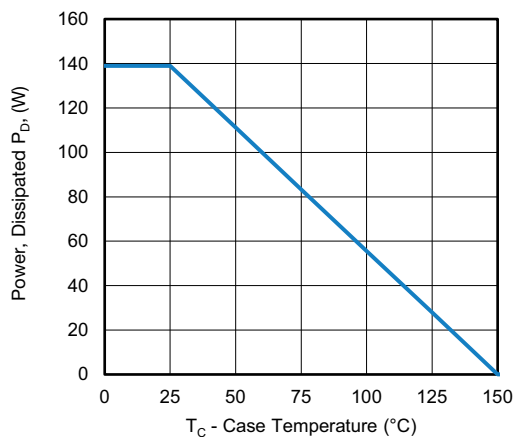
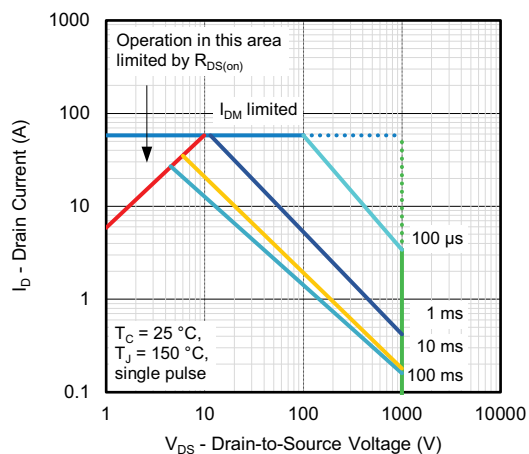
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum junction-to-ambient	R_{thJA}	-	40	°C/W
Maximum junction-to-case (drain)	R_{thJC}	-	0.9	

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 = 5 mA		-	2.69	-	V
		V _{DS} = V _{GS} , I _D = 5 mA, T _J = 150 °C		-	1.86	-	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 = 20 A		-	80	100	mΩ
		V _{GS} = 20 V, I _D = 20 A, T _J = 150 °C		-	141	176	
		V _{GS} = 18 V, I _D = 20 A		-	99	124	
		V _{GS} = 18 V, I _D = 20 A, T _J = 150 °C		-	146	183	
Dynamic							
Input capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 800 V, f = 1 MHz		-	1156	-	pF
Output capacitance	C _{oss}			-	50	-	
Reverse transfer capacitance	C _{rss}			-	5	-	
Coss Stored Energy	E _{oss}			-	10	-	μJ
Total gate charge	Q _g	V _{GS} = 18 V	I _D = 20 A, V _{DS} = 800 V	-	47.3	-	nC
Gate-source charge	Q _{gs}			-	14.2	-	
Gate-drain charge	Q _{gd}			-	17.8	-	
Gate Resistance	R _g	V _{DS} = 0 V, f = 1 MHz		-	9.8	-	Ω
Switching Characteristics							
Turn-on delay time	t _{d(on)}	V _{GS} = -5 V ~ 18 V, I _D = 20 A, V _{DS} = 800 V, R _{g(ext)} = 4.4 Ω		-	13	-	ns
Rise time	t _r			-	19	-	
Turn-off delay time	t _{d(off)}			-	15	-	
Fall time	t _f			-	8	-	
Turn-on switching energy	E _{on}			-	258	-	μJ
Turn-off switching energy	E _{off}			-	24	-	
Reverse Diode Characteristics							
Reverse recovery time	t _{rr}	V _{GS} = -5 V, I _{SD} = 20 A, V _R = 800 V, di/dt = 1000 A/μs		-	14	-	ns
Reverse recovery charge	Q _{rr}			-	35	-	nC
Reverse recovery current	I _{rrm}			-	4.5	-	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 Capacitances 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

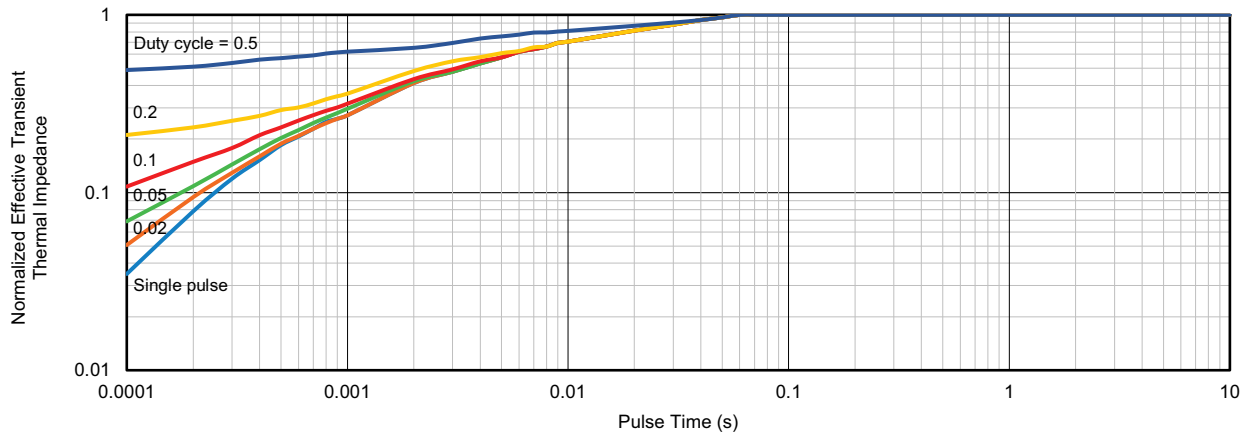
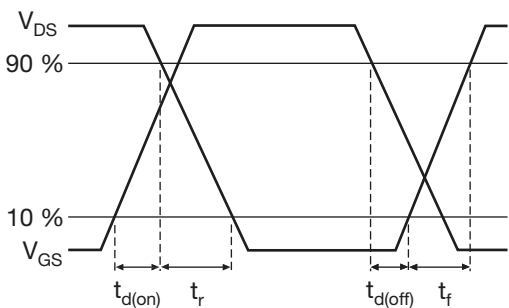
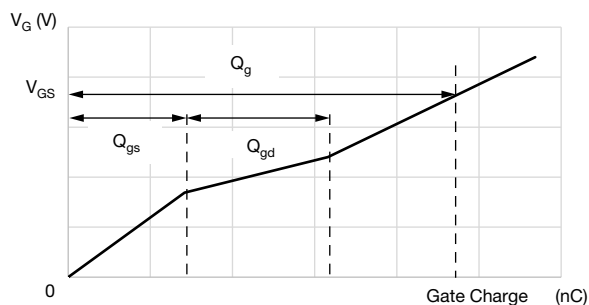
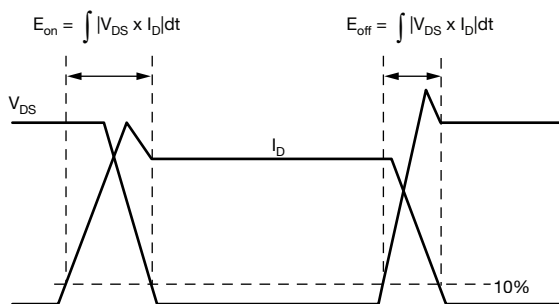
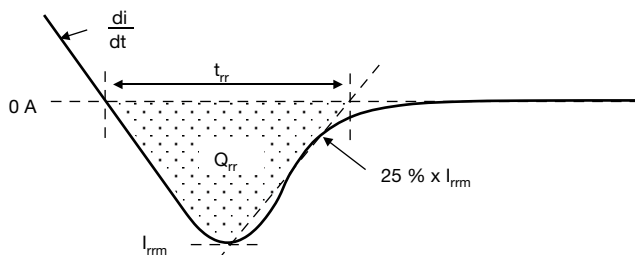
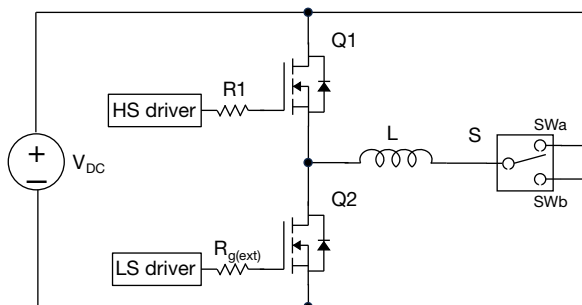


Fig. 18 - Normalized Effective Transient Thermal Impedance


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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