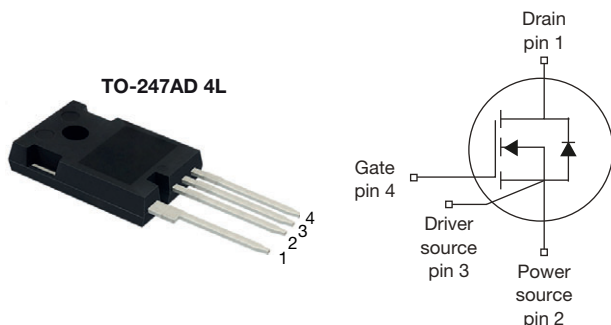


MaxSiC® 1200 V N-Channel SiC MOSFET



Marking Code: 120A080SL

PRODUCT SUMMARY		
V_{DS} (V) at T_J max.	1200	
$R_{DS(on)}$ typ. (mΩ) at 25 °C	$V_{GS} = 18$ V	80
Q_g typ. (nC)	45	
I_D (A)	31	
C_{oss} typ. (pF)	56	
P_D (W)	174	
Configuration	Single	

ORDERING INFORMATION	
Package	TO-247AD 4L
Lead (Pb)-free and halogen-free	MXP120A080SL-GE3

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	1200	V
Gate-source voltage		V_{GS}	-10 / +22	
Recommended operation voltage of gate-source		V_{GSOP}	-5 to -3 / +18	
Continuous drain current	$T_C = 25$ °C	I_D	31	A
Pulsed drain current ^a		I_{DM}	62	
Short-circuit withstand time ^b		T_{SC}	3	μs
Maximum power dissipation	$T_C = 25$ °C	P_D	174	W
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +175	°C
Soldering recommendations (peak temperature)	For 10 s		260	°C
Single pulse avalanche energy ^c		E_{AS}	113	mJ

Notes

- Repetitive rating; pulse width limited by maximum junction temperature
- $V_{GS} = 18$ V, $V_{DS} = 800$ V, $R_{g(ext)} = 20$ Ω, verified by the design / characterization
- $T_J = 25$ °C, $V_{DD} = 120$ V, $L = 1$ mH, $V_{GS} = 18$ V, $I_{AS} = 15$ A, verified by the design / characterization

FEATURES

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

APPLICATIONS

- Solar inverters
- DC/DC converters
- Energy storage systems
- UPS (uninterruptible power supplies)



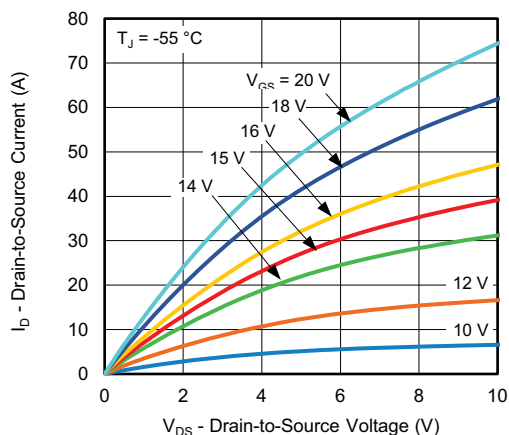
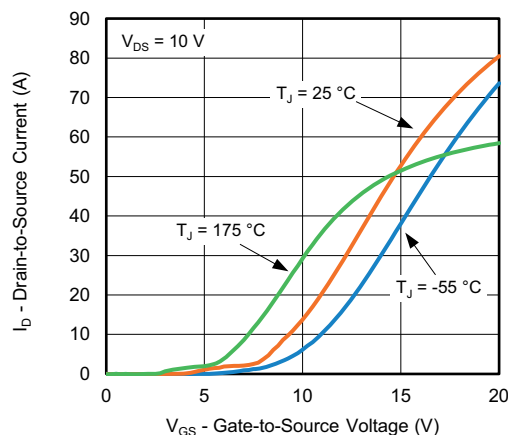
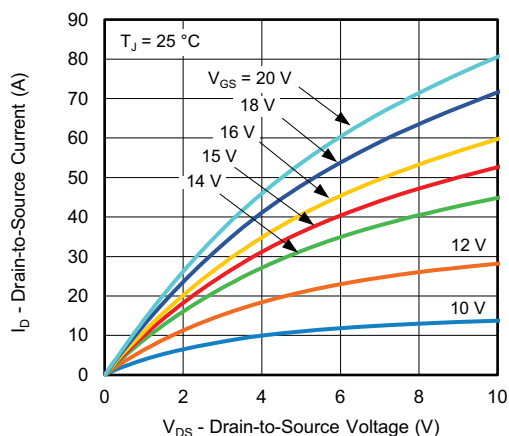
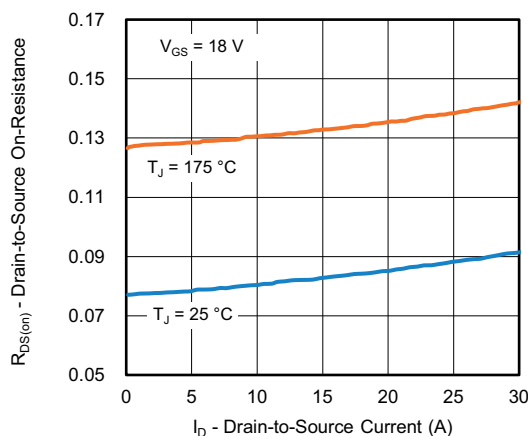
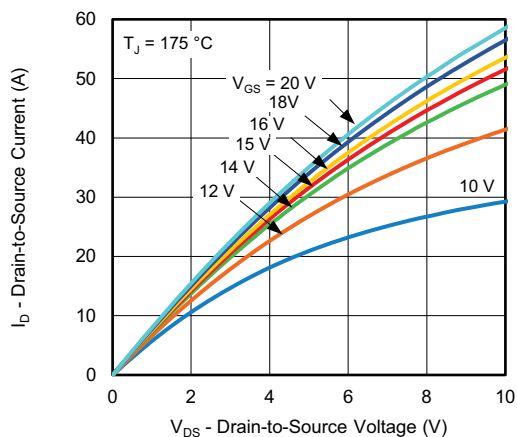
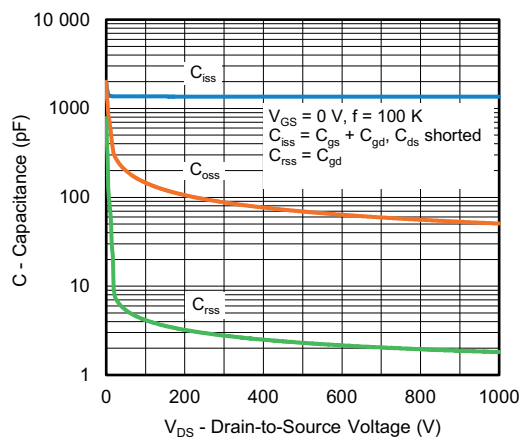
RoHS
COMPLIANT
HALOGEN
FREE

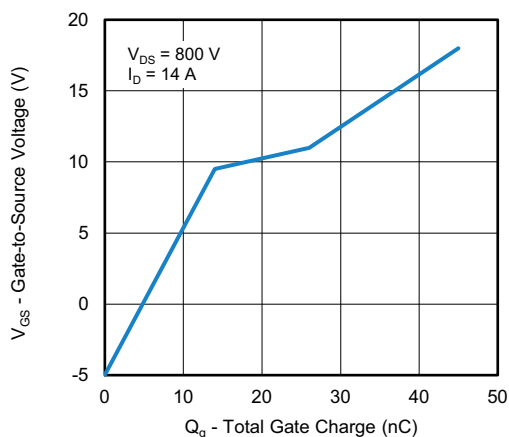
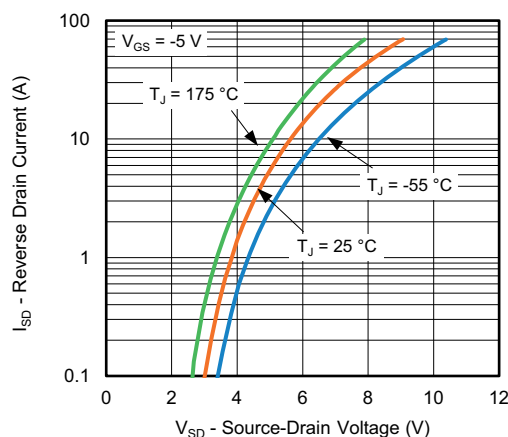
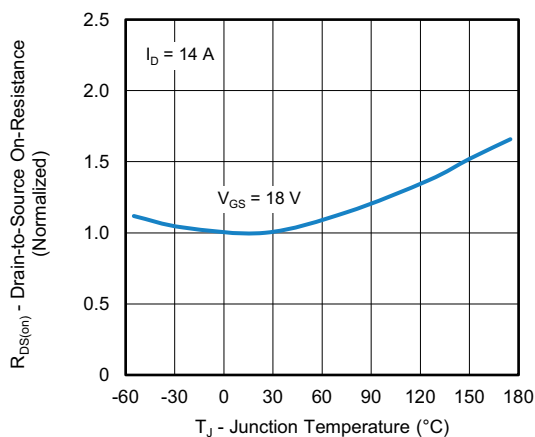
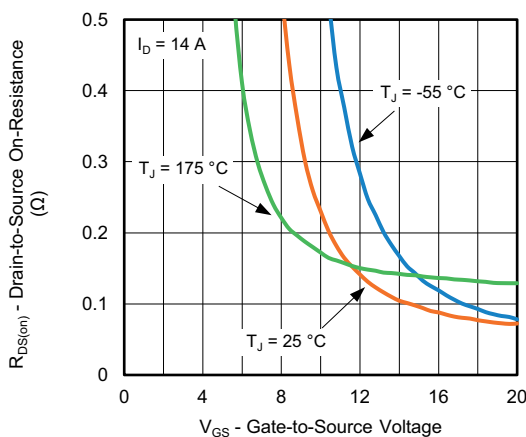
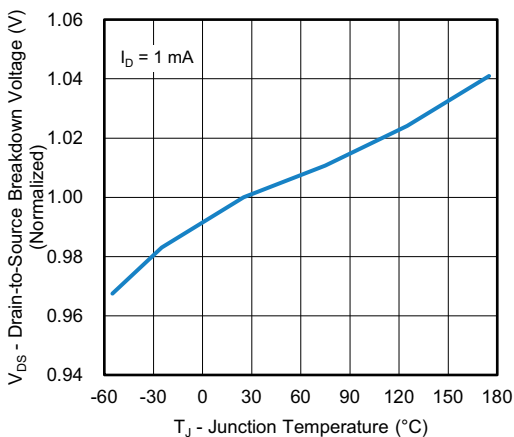
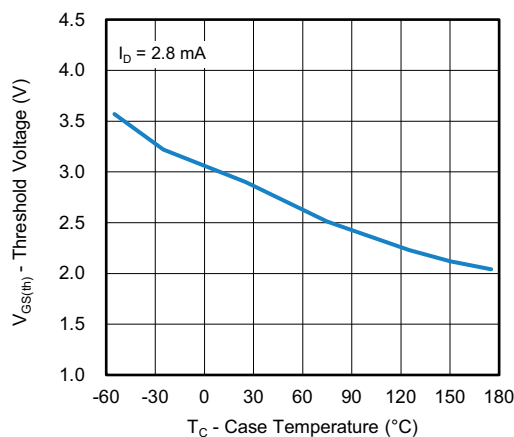
**THERMAL RESISTANCE RATINGS**

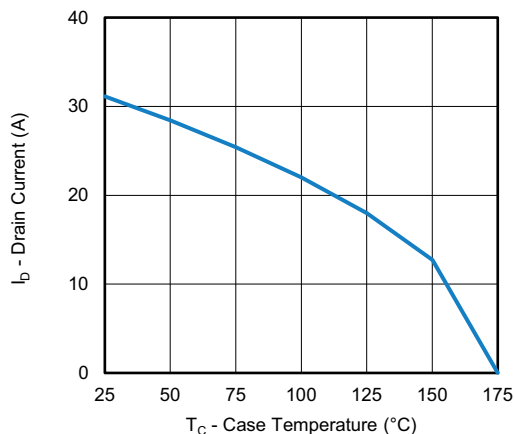
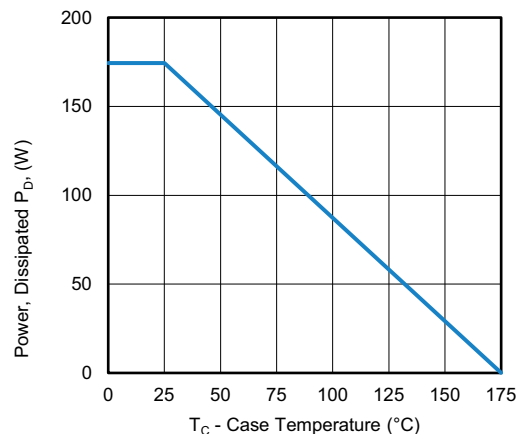
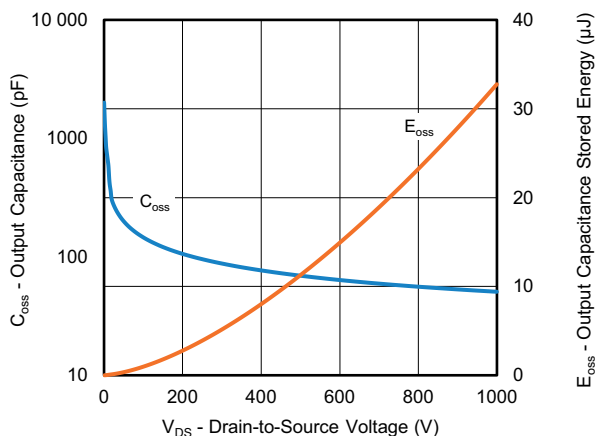
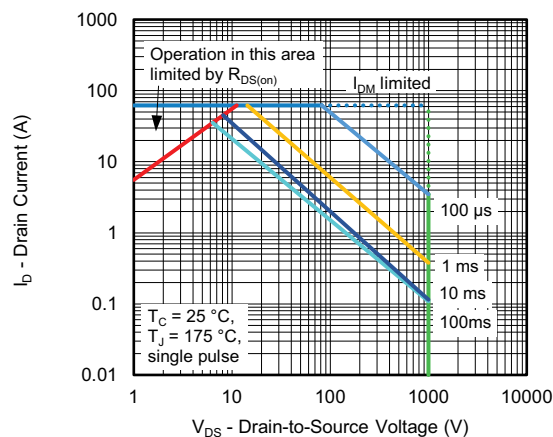
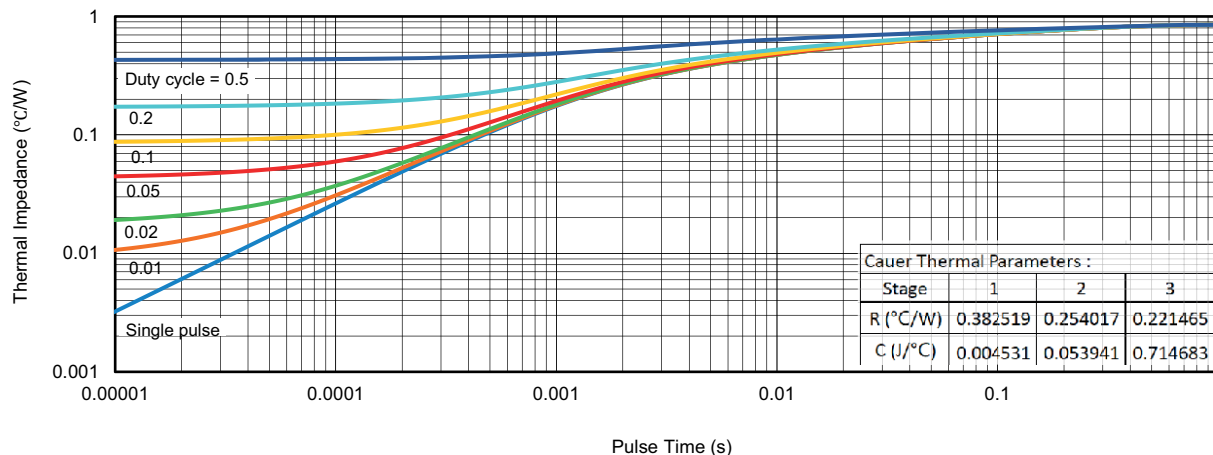
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum junction-to-ambient	R_{thJA}	-	40	°C/W
Maximum junction-to-case (drain)	R_{thJC}	-	0.86	

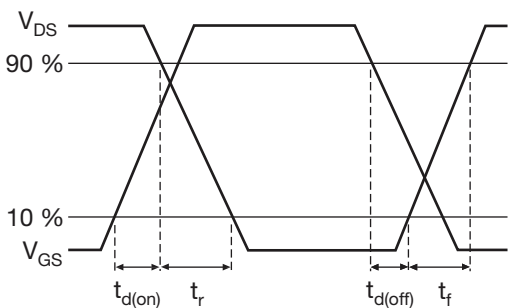
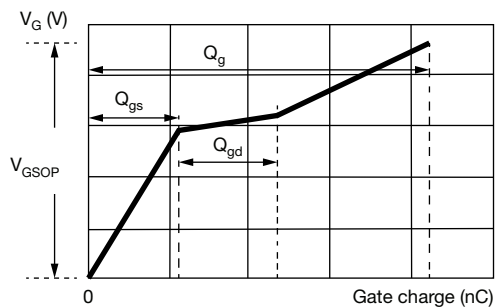
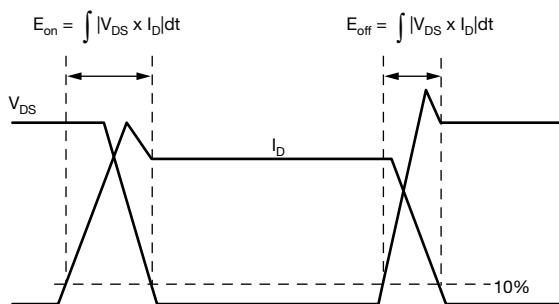
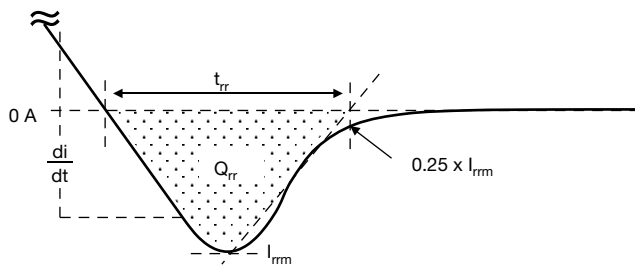
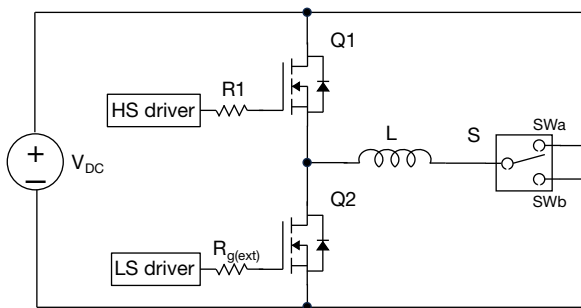
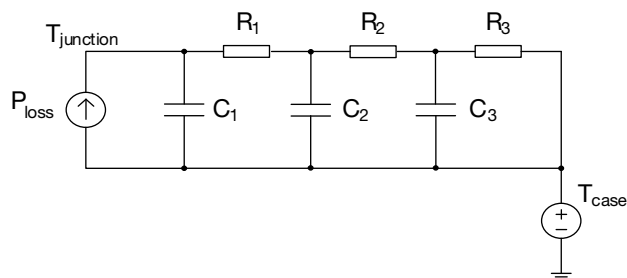
SPECIFICATIONS ($T_J = 25\text{ °C}$, unless otherwise noted)

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 = 2.8 mA	-	2.9	-	V	
		V _{DS} = V _{GS} , I _D = 2.8 mA, T _J = 175 °C	-	2.0	-	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} = 1200 V, V _{GS} = 0 V	-	-	10	μA	
Drain-source on-state resistance	R _{DS(on)}	V _{GS} = 15 V, I _D = 14 A	-	97	121	mΩ	
		V _{GS} = 18 V, I _D = 14 A	-	80	100		
		V _{GS} = 18 V, I _D = 14 A, T _J = 175 °C	-	144	-		
Transconductance	g _{fs}	V _{DS} = 10 V, I _D = 14 A	-	5.5	-	S	
Dynamic							
Input capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 800 V, f = 100 KHz	-	1356	-	pF	
Output capacitance	C _{oss}		-	56	-		
Reverse transfer capacitance	C _{rss}		-	2	-		
Total gate charge	Q _g	V _{GS} = -5 V ~ 18 V, I _D = 14 A, V _{DS} = 800 V	-	45	-	nC	
Gate-source charge	Q _{gs}		-	14	-		
Gate-drain charge	Q _{gd}		-	12	-		
Gate Resistance	R _g	V _{DS} = 0 V, f = 1 MHz	-	4	-	Ω	
Switching Characteristics							
Turn-on delay time	t _{d(on)}	V _{GS} = -5 V ~ 18 V, I _D = 14 A, V _{DS} = 800 V, R _{g(ext)} = 4.4 Ω	T _J = 25 °C	-	14	-	ns
Rise time	t _r		T _J = 175 °C	-	13	-	
			T _J = 25 °C	-	12	-	
Turn-off delay time	t _{d(off)}		T _J = 175 °C	-	12	-	
			T _J = 25 °C	-	17	-	
Fall time	t _f		T _J = 175 °C	-	18	-	
			T _J = 25 °C	-	10	-	
Turn-on switching energy	E _{on}		T _J = 175 °C	-	10	-	μJ
			T _J = 25 °C	-	132	-	
Turn-off switching energy	E _{off}		T _J = 175 °C	-	119	-	
			T _J = 25 °C	-	42	-	
Body Diode Ratings and Characteristic							
Forward diode voltage	V _{SD}	V _{GS} = -5 V, I _{SD} = 7 A, T _J = 25 °C	-	4.7	-	V	
Continuous diode forward current	I _{SD}	V _{GS} = -5 V, T _J = 25 °C	-	-	24	A	
Pulsed diode forward current	I _{SDM}		-	-	62		
Reverse recovery time	t _{rr}	V _{GS} = -5 V, I _{SD} = 14 A, V _R = 800 V, di/dt = 1000 A/μs	-	16	-	ns	
Reverse recovery charge	Q _{rr}		-	47	-	nC	
Reverse recovery current	I _{RRM}		-	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 Normalized On-Resistance vs. Drain Current

Fig. 3 Typical Output Characteristics

Fig. 6 Typical Capacitance vs. Drain-to-Source Voltage


Fig. 7 Typical Gate Charge vs. Gate-to-Source Voltage

Fig. 10 Typical Source-Drain Diode Forward Voltage

Fig. 8 Normalized On-Resistance vs. Temperature

Fig. 11 On-Resistance vs. Gate-to-Source Voltage

Fig. 9 Drain-to-Source Voltage vs. Temperature

Fig. 12 Threshold Voltage vs. Case Temperature


Fig. 13 Drain Current vs. Case Temperature

Fig. 15 Power, Dissipated P_D vs. Case Temperature

Fig. 14 Output Capacitance and its Stored Energy vs. Drain-to-Source Voltage

Fig. 16 Safe Operating Area

Fig. 17 Transient Thermal Impedance


Fig. 18 Waveforms of Switching Time

Fig. 21 Waveforms for Gate Charge

Fig. 19 Waveforms for Switching Energy

Fig. 22 Waveforms for Reverse Recovery

Fig. 20 Switching and Reverse Diode Characteristics Measurement Circuit

Fig. 23 Thermal Equivalent Circuit

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