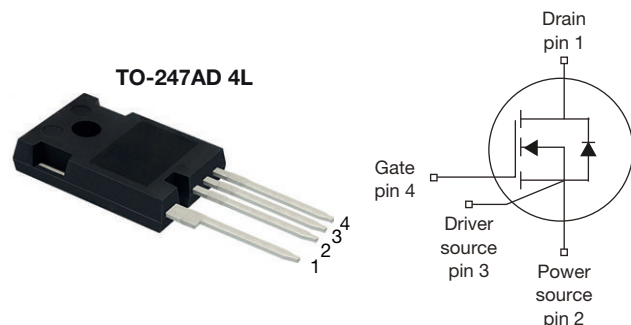


MaxSiC® 1200 V N-Channel SiC MOSFET



Marking Code: 120A063SL

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

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

PRODUCT SUMMARY

V_{DS} (V) at T_J max.	1200	
$R_{DS(on)}$ typ. (m Ω) at 25 °C	$V_{GS} = 18$ V	63
Q_g typ. (nC)	61	
I_D (A)	39	
C_{oss} typ. (pF)	70	
P_D (W)	205	
Configuration	Single	

ORDERING INFORMATION

Package	TO-247AD 4L
Lead (Pb)-free and halogen-free	MXP120A063SL-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	I_D	39	A
Pulsed drain current ^a	I_{DM}	78	
Short-circuit withstand time ^b	T_{SC}	3	μ s
Maximum power dissipation	P_D	205	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}	162	mJ

Notes

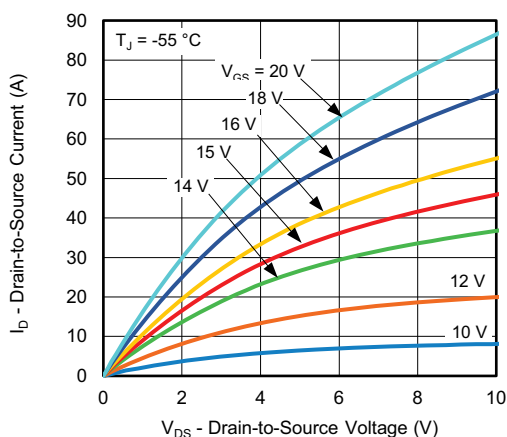
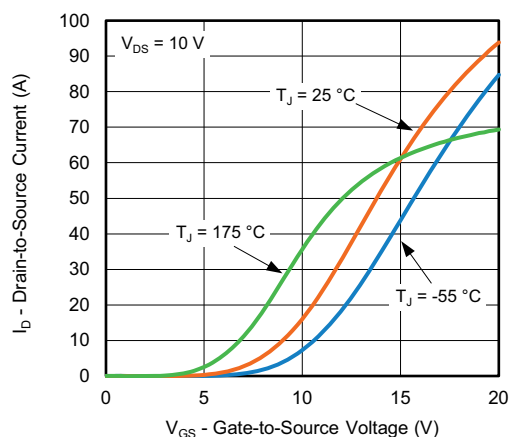
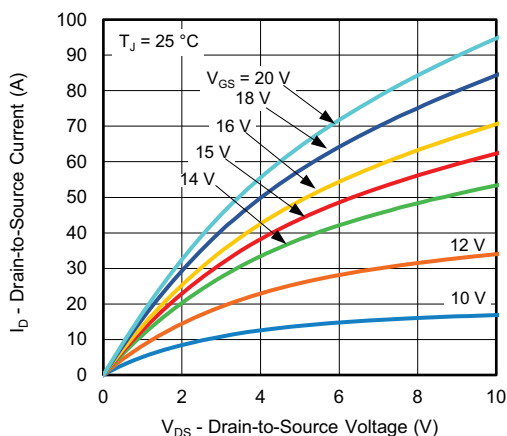
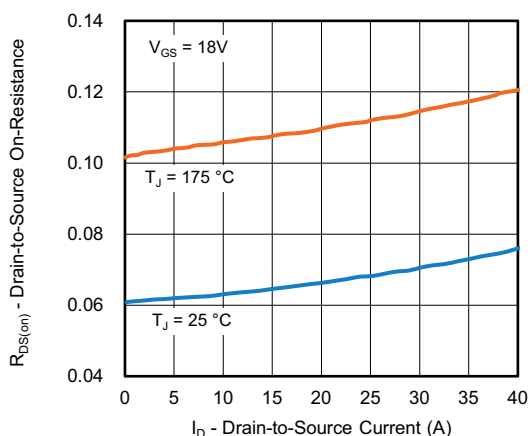
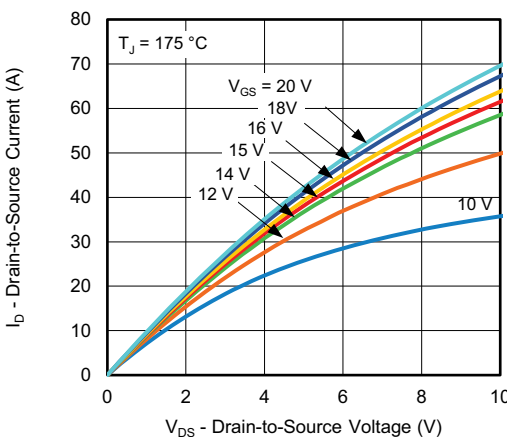
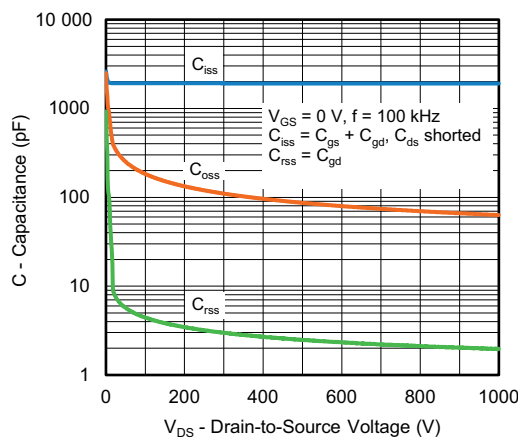
- Repetitive rating; pulse width limited by maximum junction temperature
- $V_{GS} = 18$ V, $V_{DS} = 800$ V, $R_{g(ext)} = 20$ Ω , verified by the design / characterization
- $T_J = 25$ °C, $V_{DD} = 120$ V, $L = 1$ mH, $V_{GS} = 18$ V, $I_{AS} = 18$ A, verified by the design / characterization

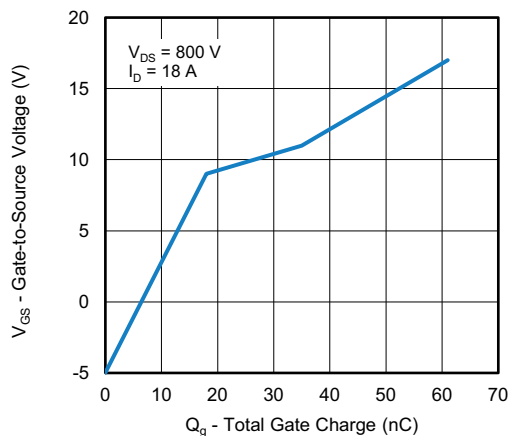
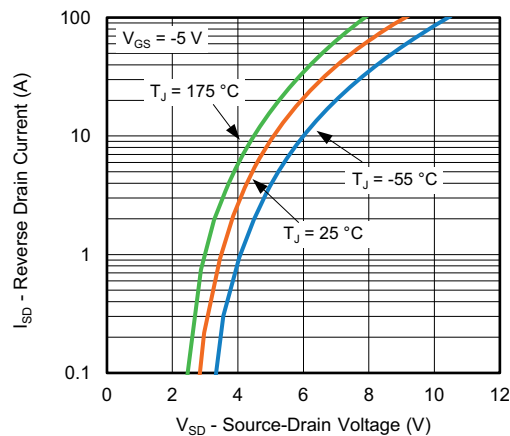
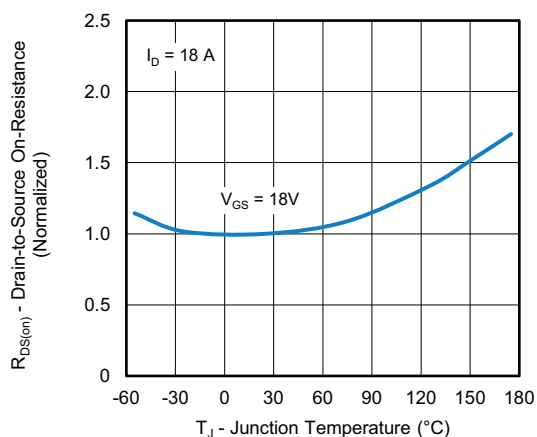
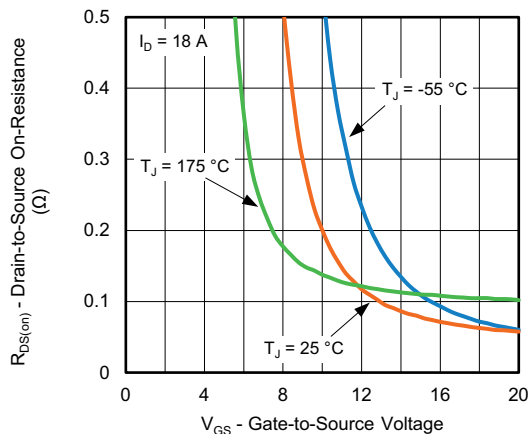
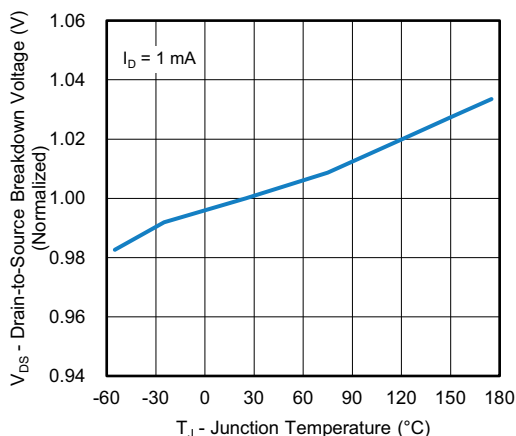
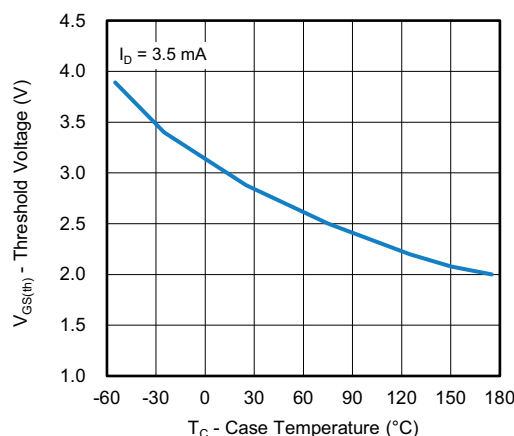
**THERMAL RESISTANCE RATINGS**

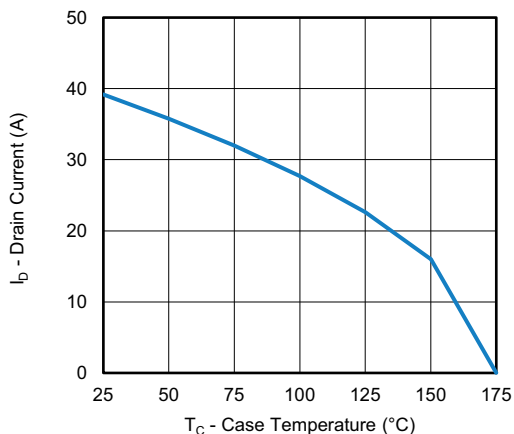
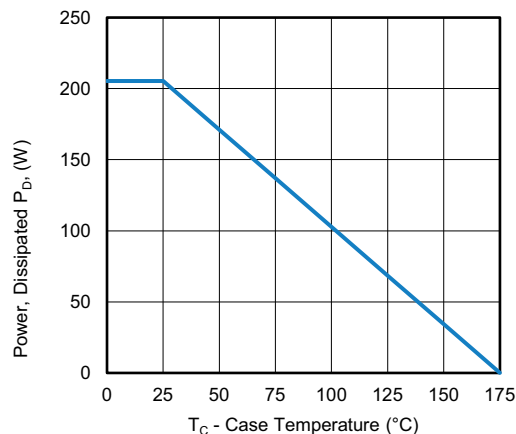
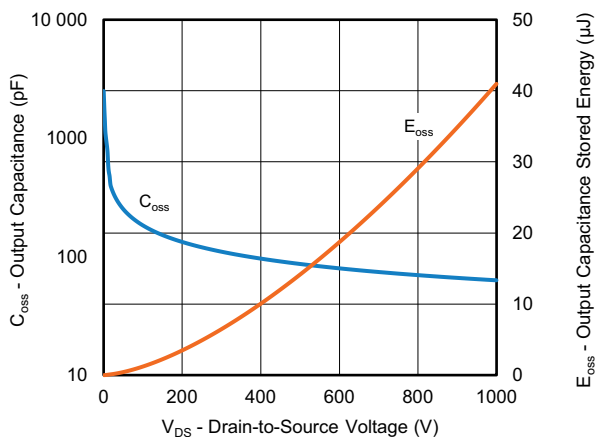
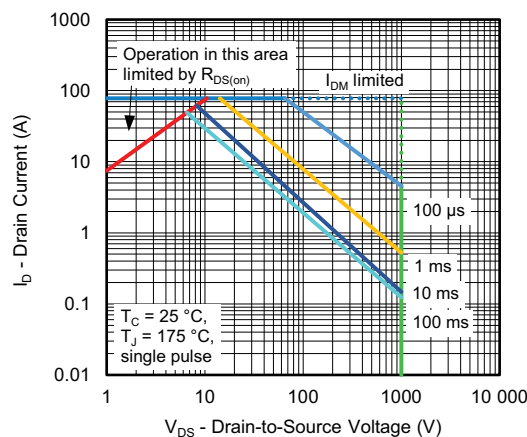
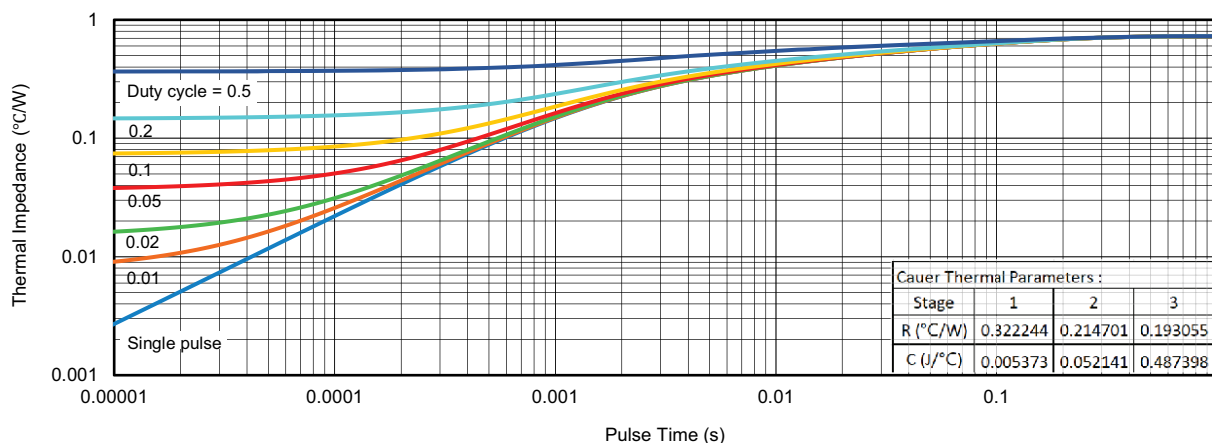
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum junction-to-ambient	R_{thJA}	-	40	°C/W
Maximum junction-to-case (drain)	R_{thJC}	-	0.73	

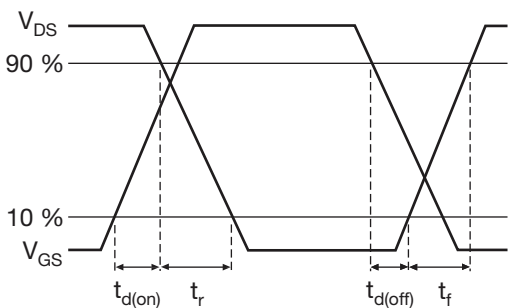
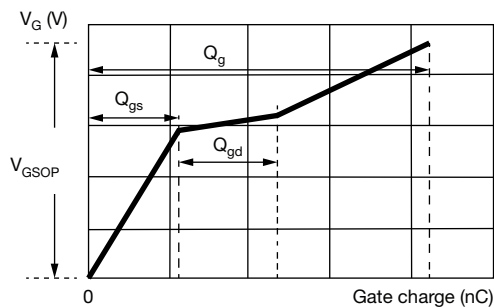
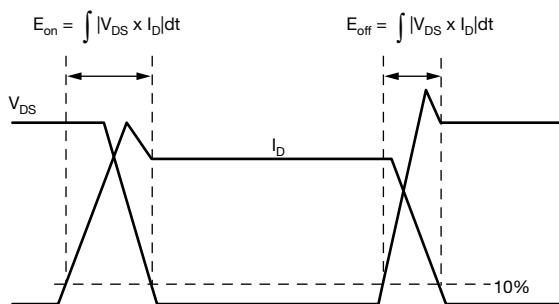
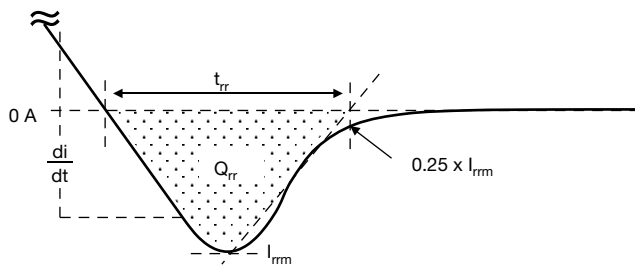
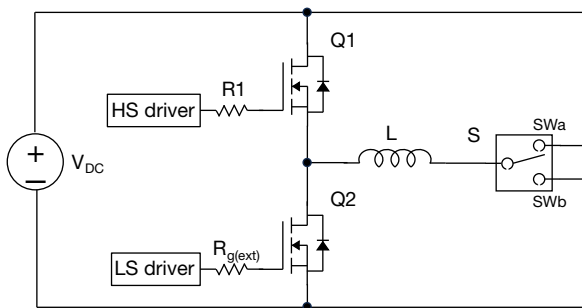
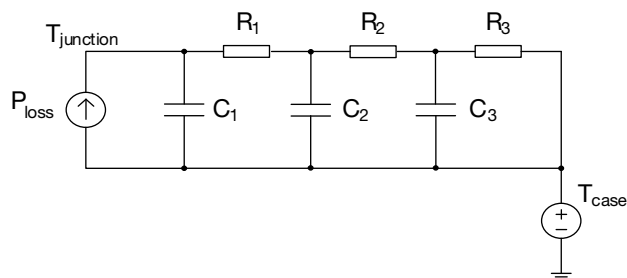
SPECIFICATIONS ($T_J = 25\text{ °C}$, unless otherwise noted)

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 = 3.5 mA	-	2.9	-	V	
		V _{DS} = V _{GS} , I _D = 3.5 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 = 18 A	-	75	94	mΩ	
		V _{GS} = 18 V, I _D = 18 A	-	63	79		
		V _{GS} = 18 V, I _D = 18 A, T _J = 175 °C	-	107	-		
Transconductance	g _{fs}	V _{DS} = 10 V, I _D = 18 A	-	7	-	S	
Dynamic							
Input capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 800 V, f = 100 KHz	-	1909	-	pF	
Output capacitance	C _{oss}		-	70	-		
Reverse transfer capacitance	C _{rss}		-	2	-		
Total gate charge	Q _g	V _{GS} = -5 V ~ 18 V, I _D = 18 A, V _{DS} = 800 V	-	61	-	nC	
Gate-source charge	Q _{gs}		-	18	-		
Gate-drain charge	Q _{gd}		-	17	-		
Gate Resistance	R _g	V _{DS} = 0 V, f = 1 MHz	-	3	-	Ω	
Switching Characteristics							
Turn-on delay time	t _{d(on)}	V _{GS} = -5 V ~ 18 V, I _D = 18 A, V _{DS} = 800 V, R _{g(ext)} = 4.4 Ω	T _J = 25 °C	-	17	-	ns
Rise time	t _r		T _J = 175 °C	-	15	-	
			T _J = 25 °C	-	14	-	
			T _J = 175 °C	-	13	-	
Turn-off delay time	t _{d(off)}		T _J = 25 °C	-	21	-	
			T _J = 175 °C	-	23	-	
Fall time	t _f		T _J = 25 °C	-	10	-	μJ
			T _J = 175 °C	-	10	-	
Turn-on switching energy	E _{on}		T _J = 25 °C	-	175	-	
			T _J = 175 °C	-	151	-	
Turn-off switching energy	E _{off}		T _J = 25 °C	-	57	-	
			T _J = 175 °C	-	56	-	
Body Diode Ratings and Characteristic							
Forward diode voltage	V _{SD}	V _{GS} = -5 V, I _{SD} = 9 A, T _J = 25 °C	-	4.8	-	V	
Continuous diode forward current	I _{SD}	V _{GS} = -5 V, T _J = 25 °C	-	-	29	A	
Pulsed diode forward current	I _{SDM}		-	-	78		
Reverse recovery time	t _{rr}	V _{GS} = -5 V, I _{SD} = 18 A, V _R = 800 V, di/dt = 1000 A/μs	-	18	-	ns	
Reverse recovery charge	Q _{rr}		-	60	-	nC	
Reverse recovery current	I _{RRM}		-	6	-	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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