

# M2M-0017-120D

## Silicon Carbide Power MOSFET

### N-Channel Enhancement Mode

#### Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Halogen Free, RoHS Compliant

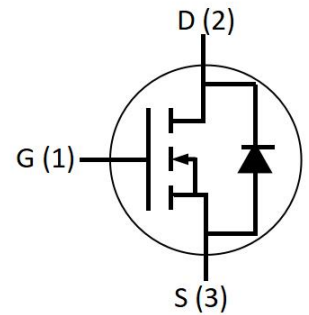
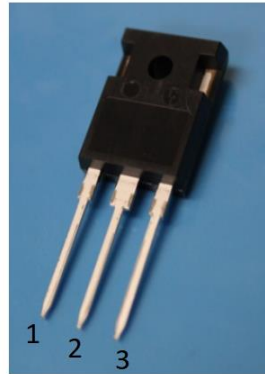
#### Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

#### Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives
- Pulsed Power applications

#### Package



Part Number	Package
M2M-0017-120D	TO-247-3

#### Maximum Ratings ( $T_c = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{DSmax}$	Drain - Source Voltage	1200	V	$V_{GS}=0V, I_D=100\mu A$	
$V_{GSmax}$	Gate - Source Voltage	-8/+25	V	Absolute maximum values	
$V_{GSop}$	Gate - Source Voltage	-5/+18	V	Recommended operational values	
$I_D$	Continuous Drain Current	97 85	A	$V_{GS}=18V, T_{VJ}=25^\circ\text{C}$ $V_{GS}=18V, T_{VJ}=100^\circ\text{C}$	
$I_{DM}$	Pulse Drain Current	200	A	Pulse width limited by $T_{VJmax}$	
$P_D$	Power Dissipation	600	W	$T_c=25^\circ\text{C}, T_{VJ}=150^\circ\text{C}$	
$T_J, T_{stg}$	Operating Junction and Storage Temperature	-55 to +175	$^\circ\text{C}$		

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MaxPower SiC Semiconductor Co., Ltd.

V1.0

**Electrical Characteristics** ( $T_c = 25^\circ\text{C}$  unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1200			V	$V_{GS}=0V, I_D=100\mu A$	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	2.5	4.0	V	$V_{GS}=V_{DS}, I_{DS}=25mA, T_{VJ}=25^\circ\text{C}$	
			1.8			$V_{GS}=V_{DS}, I_{DS}=25mA, T_{VJ}=175^\circ\text{C}$	
$I_{DSS}$	Zero Gate Voltage Drain Current		8	100	$\mu A$	$V_{DS}=1200V, V_{GS}=0V$	
$I_{GSS}$	Gate-Source Leakage Current		20	150	nA	$V_{GS}=18V, V_{DS}=0V$	
$R_{DS(on)}$	Drain-Source on-state Resistance		17	23	m $\Omega$	$V_{GS}=18V, I_D=75A, T_{VJ}=25^\circ\text{C}$	
			29			$V_{GS}=18V, I_D=75A, T_{VJ}=175^\circ\text{C}$	
$g_{fs}$	Transconductance		23		S	$V_{DS}=20V, I_D=75A, T_{VJ}=25^\circ\text{C}$	
			13		S	$V_{DS}=20V, I_D=75A, T_{VJ}=175^\circ\text{C}$	
$C_{iss}$	Input Capacitance		4150		pF	$V_{GS}=0V, V_{DS}=800V, f=100KHz$ $V_{AC}=25mV$	
$C_{oss}$	Output Capacitance		187				
$C_{rss}$	Reverse Transfer Capacitance		27				
$E_{ON}$	Turn-On Switching Energy		4622		$\mu J$	$V_{DS}=800V, V_{GS}=-5/18V, I_D=75A,$ $R_{G(ext)}=10\Omega, L=99\mu H$	
$E_{OFF}$	Turn-Off Switching Energy		1354				
$t_{d(on)}$	Turn-On Delay Time		101		ns	$V_{DS}=800V, V_{GS}=-5/18V$ $I_D=75A, R_{G(ext)}=10\Omega,$	
$t_r$	Rise Time		55				
$t_{d(off)}$	Turn-Off Delay Time		129				
$t_f$	Fall Time		38				
$R_{G(int)}$	Internal Gate Resistance		1.0		$\Omega$	$f=1MHz, V_{AC}=25mV$	
$Q_{gs}$	Gate to Source Charge		67		nC	$V_{DS}=800V, V_{GS}=-5/18V$ $I_D=75A$	
$Q_{gd}$	Gate to Drain Charge		148				
$Q_g$	Total Gate Charge		287				

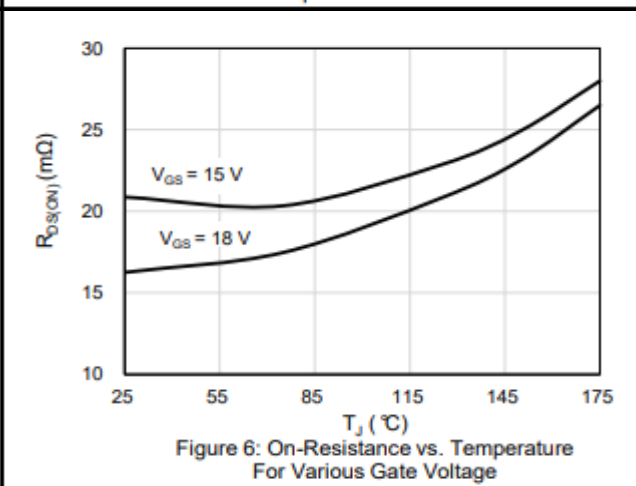
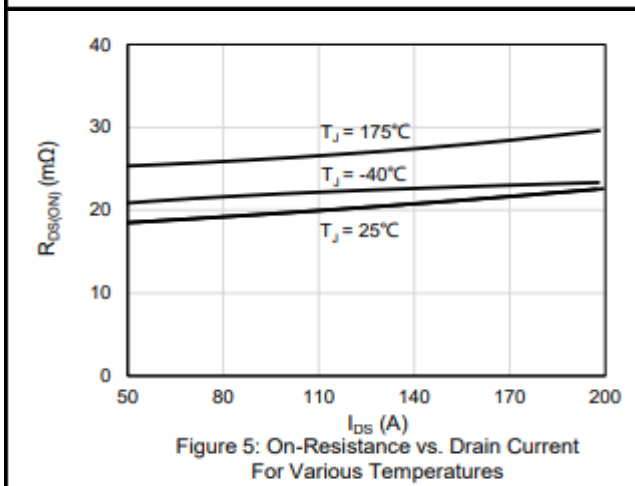
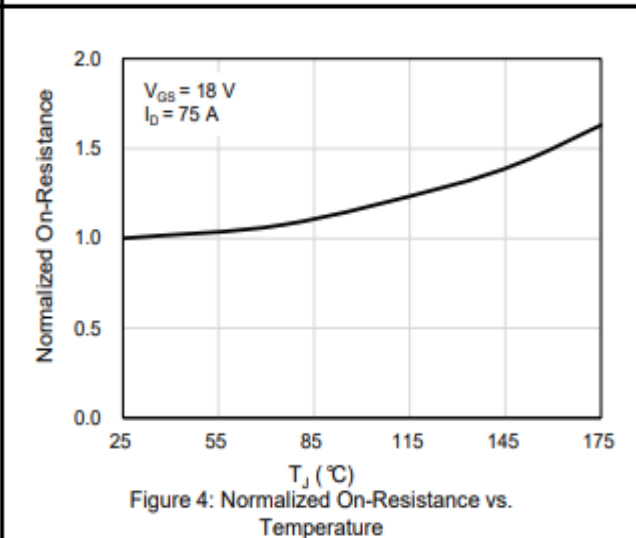
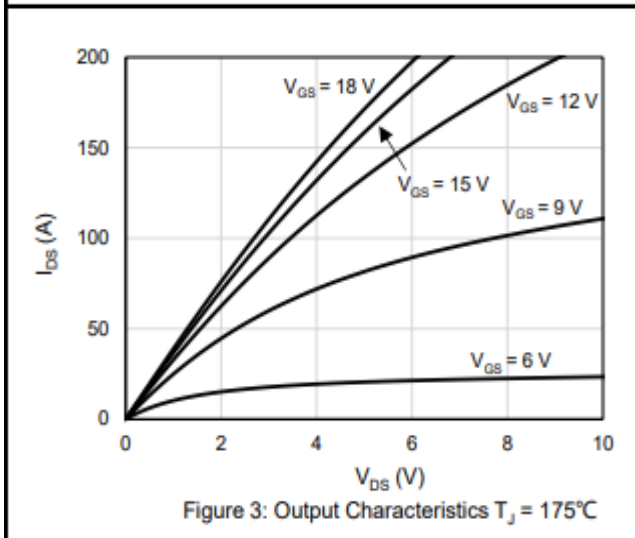
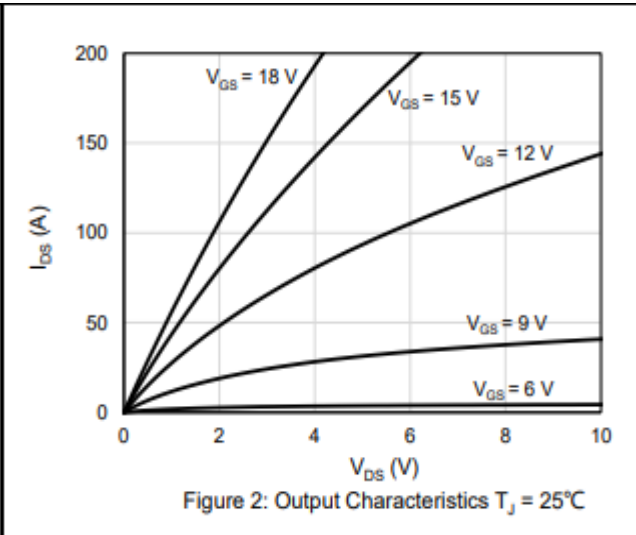
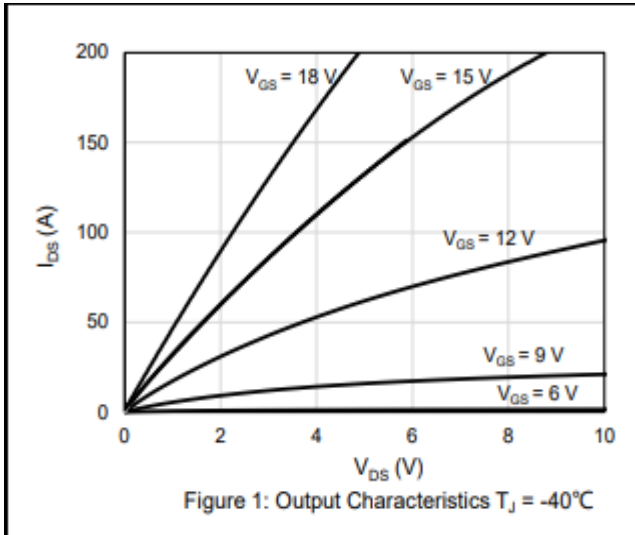
**Reverse Diode Characteristics** ( $T_c = 25^\circ\text{C}$  unless otherwise specified)

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_{SD}$	Diode Forward Voltage	4.7		V	$V_{GS}=-5V, I_{SD}=35A, T_{VJ}=25^\circ\text{C}$	
		3.6		V	$V_{GS}=-5V, I_{SD}=35A, T_{VJ}=175^\circ\text{C}$	
$I_S$	Continuous Diode Forward Current	97		A	$T_{VJ}=25^\circ\text{C}$	
$t_{rr}$	Reverse Recovery time	82		ns	$V_{GS}=-5V, I_{SD}=75A, V_R=800V,$ $di/dt=1400A/\mu s; T_{VJ}=175^\circ\text{C}$	
$Q_{rr}$	Reverse Recovery Charge	1156		nC		
$I_{rrm}$	Peak Reverse Recovery Current	26		A		

**Thermal Characteristics**

Symbol	Parameter	Typ.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.25	°C/W		
$R_{\theta JA}$	Thermal Resistance From Junction to Ambient	36			

**Typical Performance**



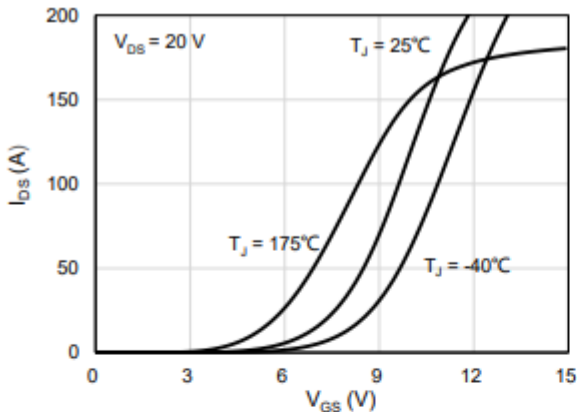


Figure 7: Transfer Characteristics For Various Junction Temperature

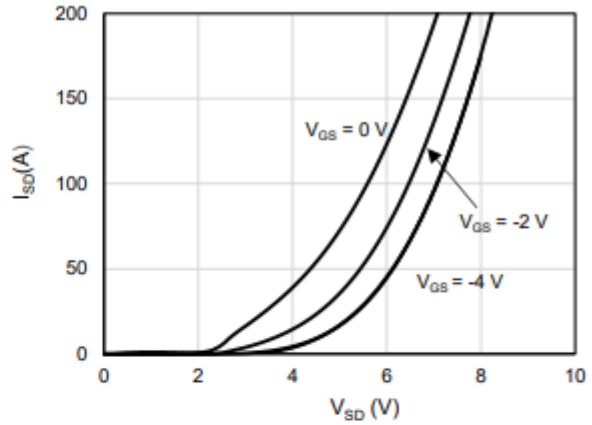


Figure 8: Body Diode Characteristics at -40°C

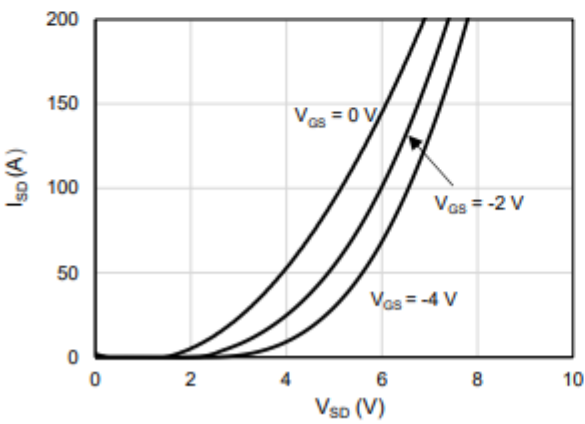


Figure 9: Body Diode Characteristics at 25°C

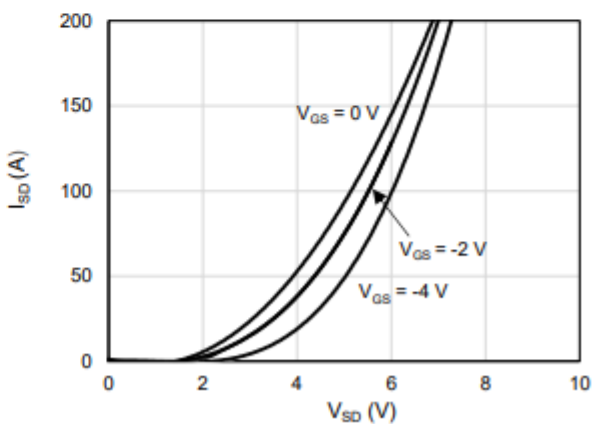


Figure 10: Body Diode Characteristics at 175°C

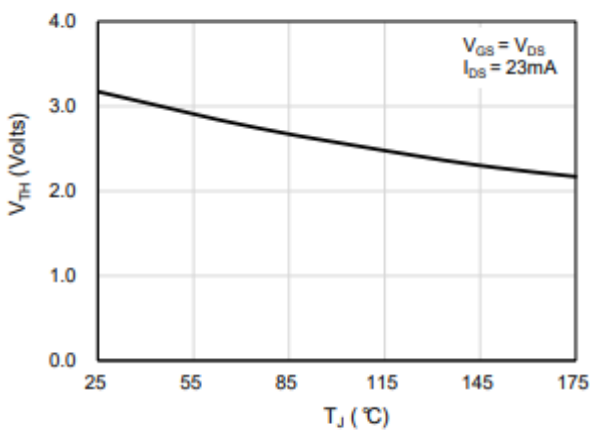


Figure 11: Threshold Voltage vs. Temperature

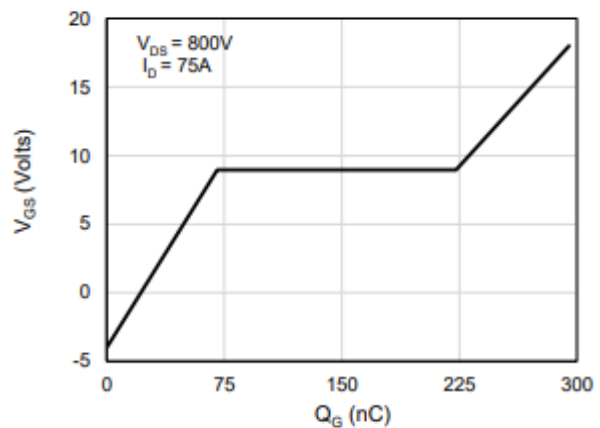
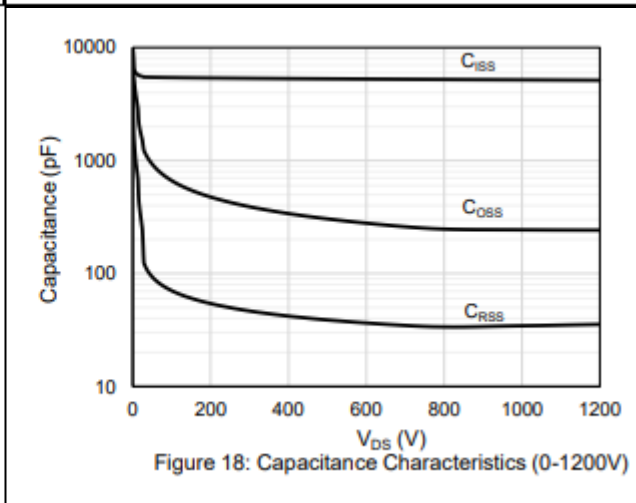
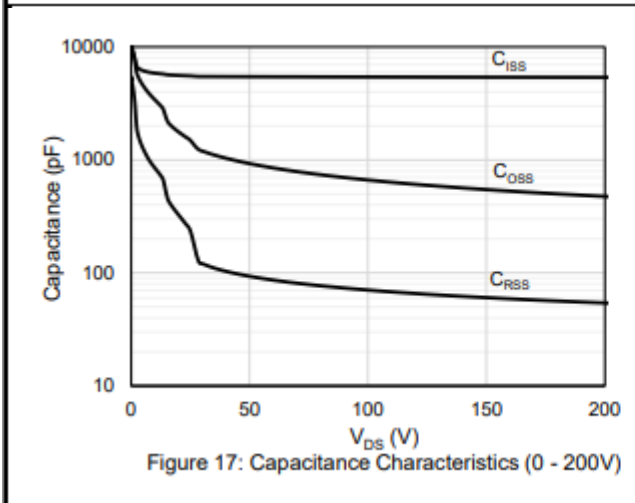
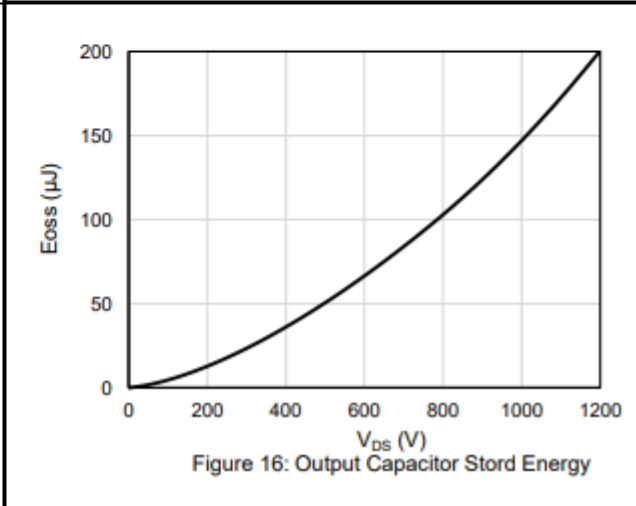
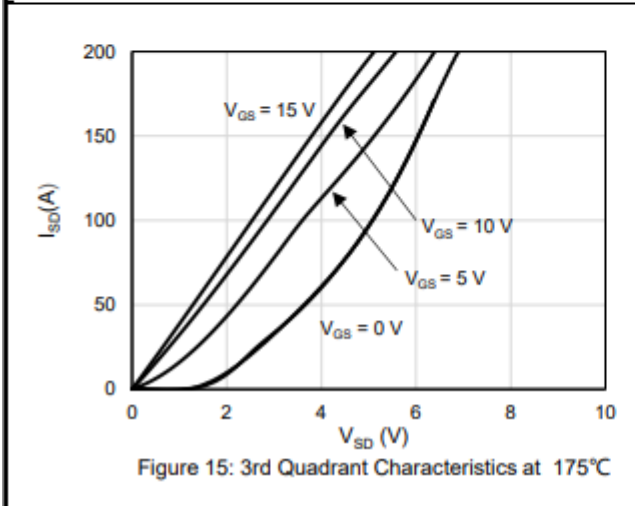
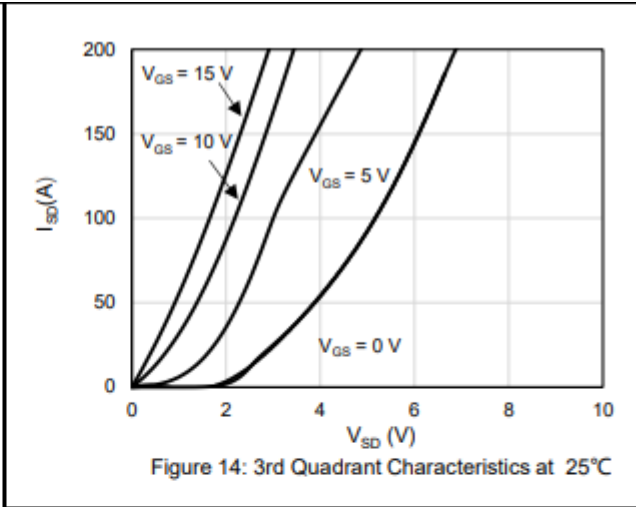
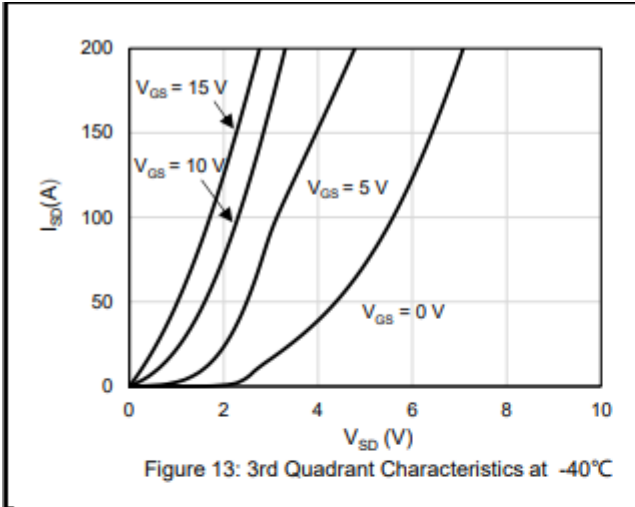
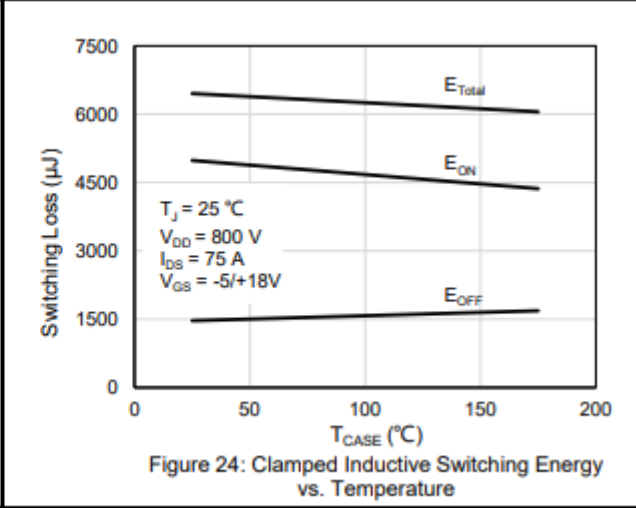
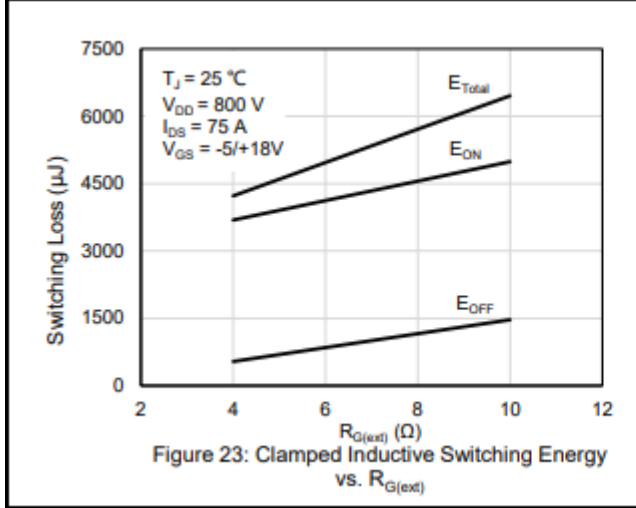
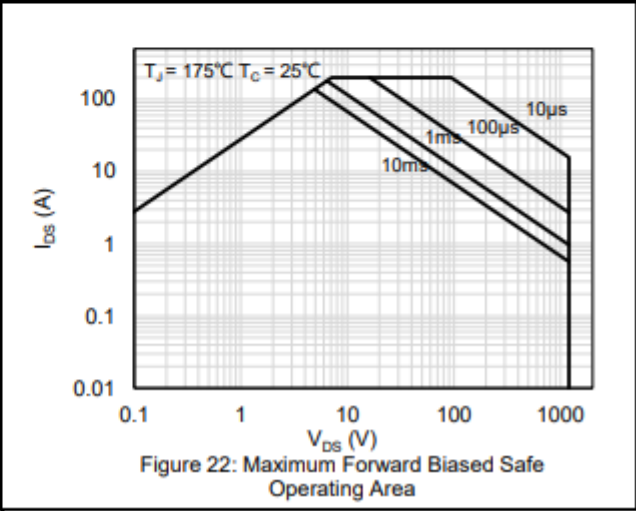
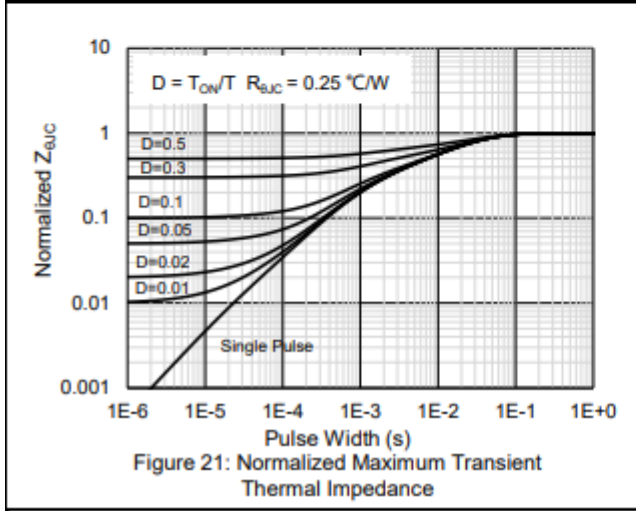
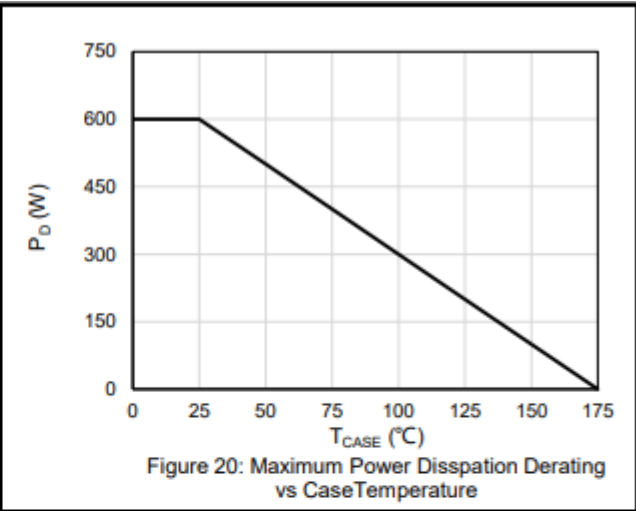
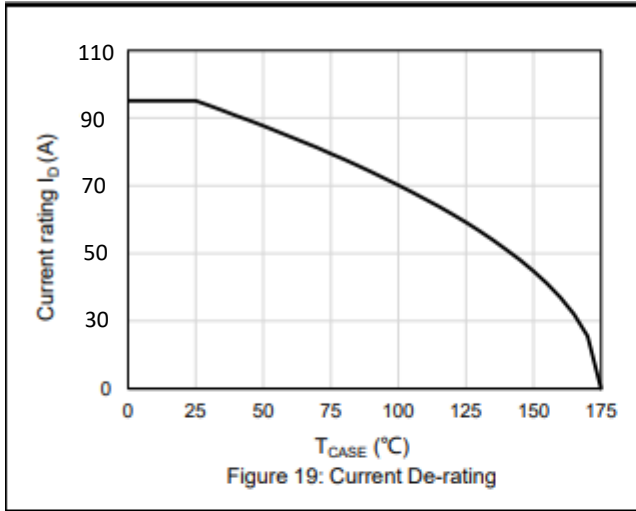


Figure 12: Gate-Charge Characteristics





## Package Outlines

### TO-247-3L PKG Outlines

