M2M-0080-120K

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

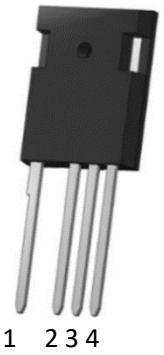
Benefits

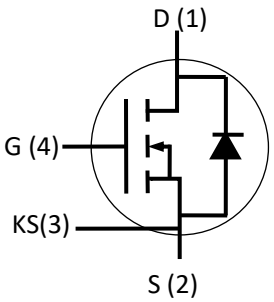
- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

Applications

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

Package





Part Number	Package
M2M-0080-120K	TO-247-4

Maximum Ratings (T_c = 25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DSmax}	Drain - Source Voltage	1200	V	V_{GS}=0V,I_D=100μA	
V_{GSmax}	Gate - Source Voltage	-10/+25	V	Absolute maximum values	
V_{GSop}	Gate - Source Voltage	-5/+20	V	Recommended operational values	
I_D	Continuous Drain Current	28 20	A	V_{GS}=20V , T_C=25°C V_{GS}=20V , T_C=100°C	
I_{DM}	Pulse Drain Current	60	A	Pulse width limited by T_{jmax}	
P_D	Power Dissipation	166	W	T_C=25°C, T_J=150°C	Fig. 10
T_J, T_{stg}	Operating Junction and Storage Temperature	-55 to +150	°C		

Electrical Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1200			V	V_{GS}=0V,I_D=100μA	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	2.4	4.0	V	V_{GS}= V_{DS}, I_{DS}=5mA,T_C=25°C	Fig. 6
			1.73			V_{GS}= V_{DS}, I_{DS}=5mA,T_C=150°C	
I_{DSS}	Zero Gate Voltage Drain Current		1	100	μA	V_{DS}= 1200V, V_{GS}=0V	
I_{GSS}	Gate-Source Leakage Current		20	200	nA	V_{GS}=20V, V_{DS}= 0V	
$R_{DS(on)}$	Drain-Source on-state Resistance		80	98	mΩ	V_{GS}=20V, I_D=20A, T_C=25°C	Fig. 4
			120			V_{GS}=20V, I_D=20A, T_C=150°C	
g_{fs}	Transconductance		7.0		S	V_{GS} = 20 V, I_D = 20A, T_J = 25 °C	Fig. 5
			6.6			V_{GS} = 20 V, I_D = 20A, T_J = 150 °C	
Ciss	Input Capacitance		2016		pF	V_{GS}=0V, V_{DS}=1000 V, f=1MHz V_{AC}=25 mV	Fig. 8
Coss	Output Capacitance		72.6				
Crss	Reverse Transfer Capacitance		17.9				
E_{ON}	Turn-On Switching Energy		180		μJ	V_{DS}=800V, V_{GS}=-5/20V, I_D= 20A, $R_{G(ext)}$ = 5Ω, L= 142 μH	
E_{OFF}	Turn-Off Switching Energy		70				
$t_{d(on)}$	Turn-On Delay Time		23		ns	V_{DD}=800V, V_{GS}=-5/20 V I_D = 20A, $R_{G(ext)}$ = 5 Ω , R_L=40Ω , Timing relative to V_{DS}	
t_r	Rise Time		60				
$t_{d(off)}$	Turn-Off Delay Time		17				
t_f	Fall Time		12				
$R_{G(int)}$	Internal Gate Resistance		2.8		Ω	f=1 MHz, V_{AC}=25mV	
Q_{gs}	Gate to Source Charge		23		nC	V_{DD}=800V, V_{GS}=-5/20 V I_D = 20A	Fig. 9
Q_{gd}	Gate to Drain Charge		26				
Q_g	Total Gate Charge		85				

Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	3.5		V	V_{GS} = -5V, I_{SD} = 10 A, T_J = 25 °C	Fig. 7
		3.3		V	V_{GS} =- 5V, I_{SD} = 10 A, T_J = 150 °C	
I_S	Continuous Diode Forward Current		28	A	T_C = 25°C	
t_{rr}	Reverse Recovery time	18		ns	V_{GS} = -5V, I_{SD} = 20 A, V_R= 800V, dif/dt=1200A/μs;	
Q_{rr}	Reverse Recovery Charge	80		nC		
I_{rrm}	Peak Reverse Recovery Current	8.0		A		

Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.75	℃/W		Fig. 11
$R_{\theta JA}$	Thermal Resistance From Junction to Ambient	35			

Typical Performance

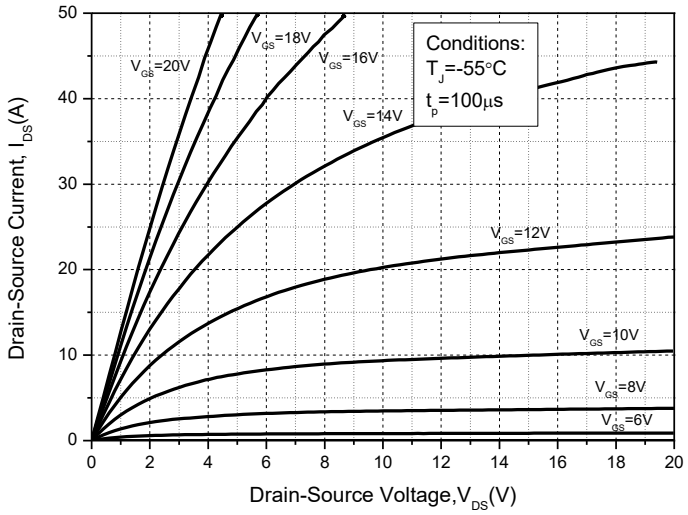


Figure 1. Output Characteristics T_J = -55 ℃

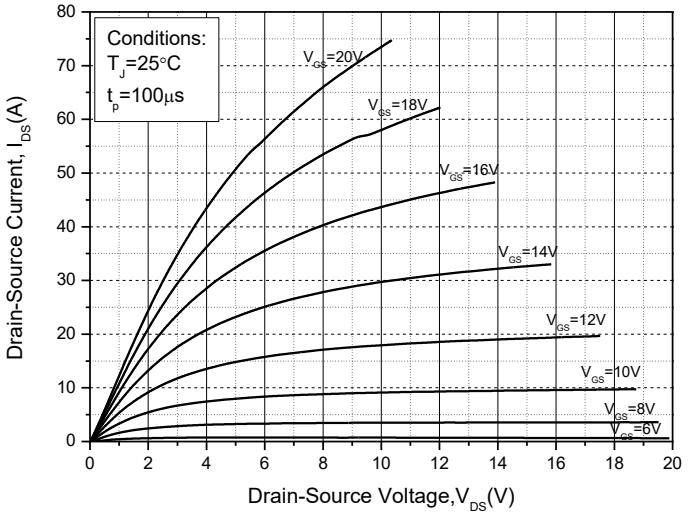


Figure 2. Output Characteristics T_J = 25 ℃

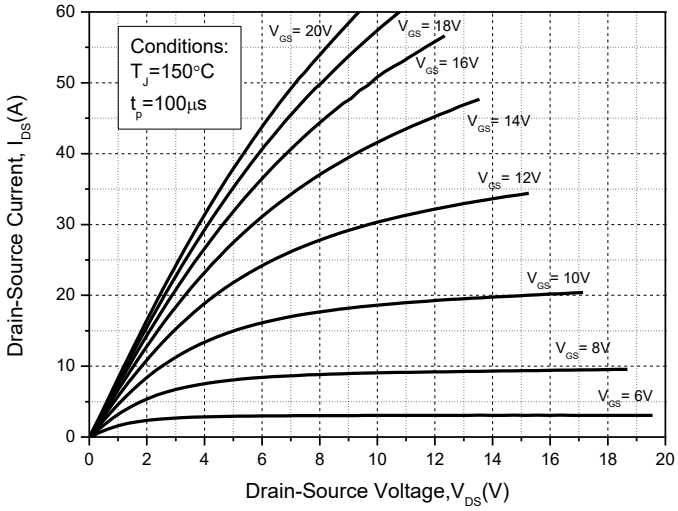


Figure 3. Output Characteristics T_J =150 ℃

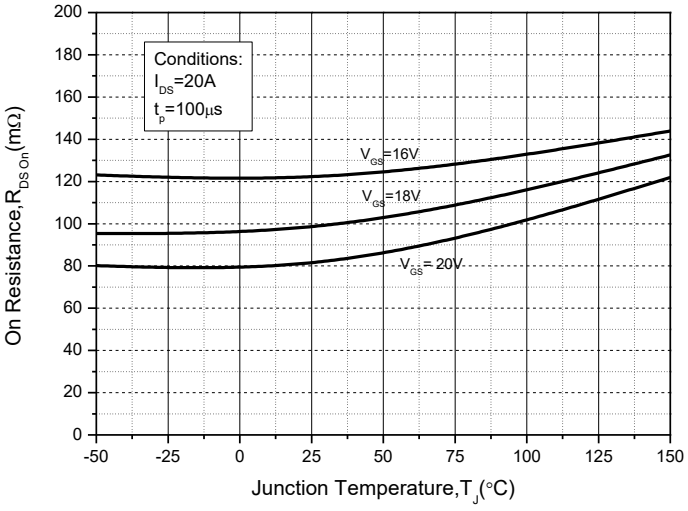


Figure 4. On-Resistance For Various Gate Voltage

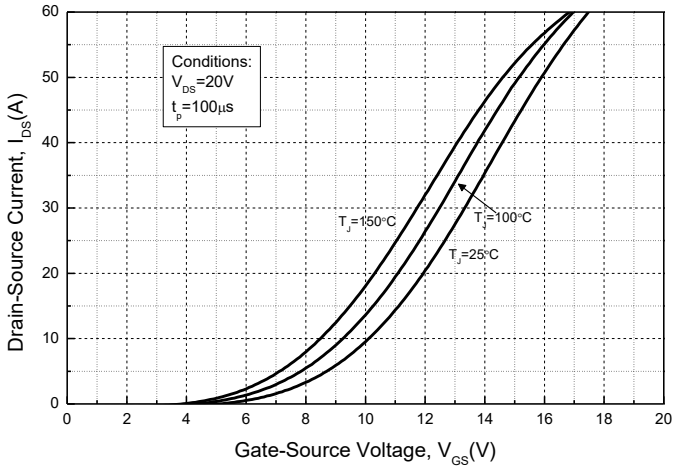


Figure 5. Transfer Characteristic for Various Junction Temperatures

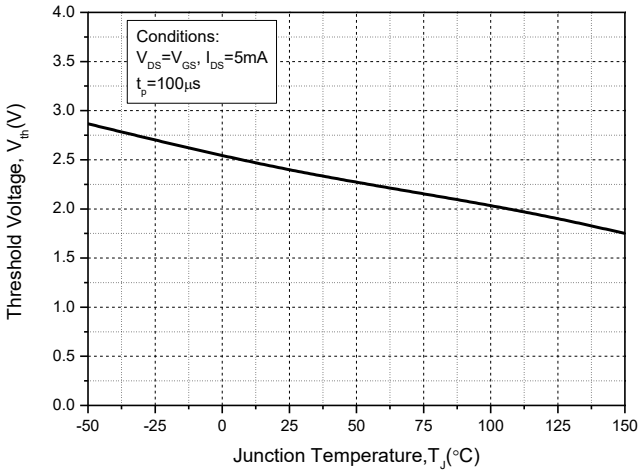


Figure 6. Threshold Voltage vs. Temperature

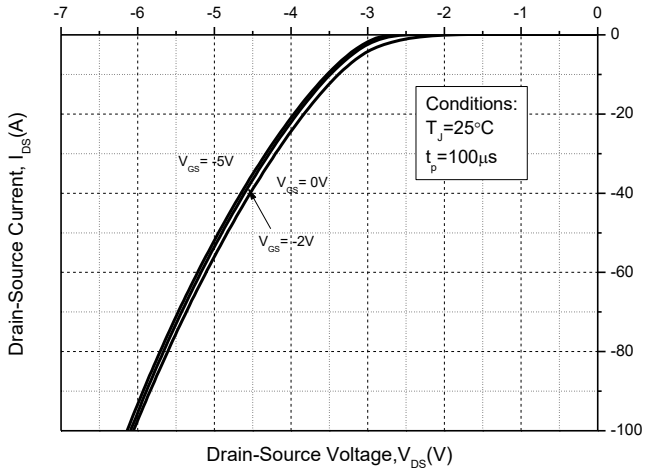


Figure 7. Body Diode Characteristics

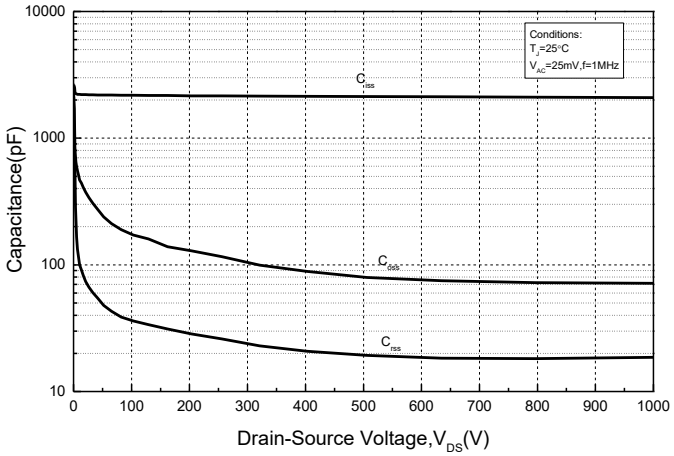


Figure 8. Capacitances vs. Drain-Source Voltage

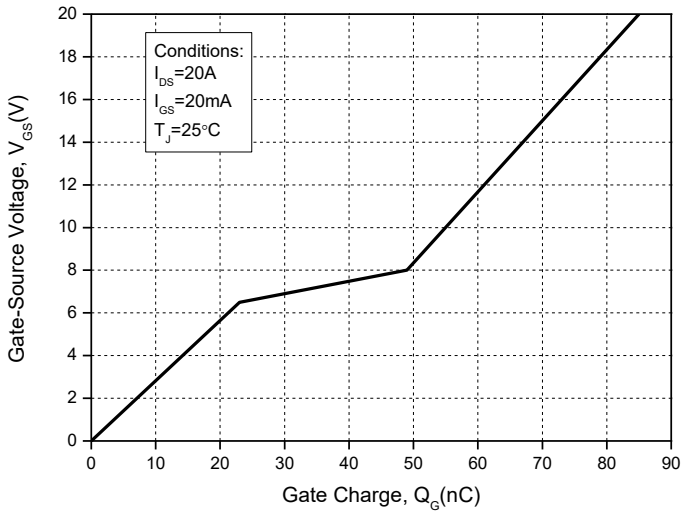


Figure 9. Gate Charge Characteristics

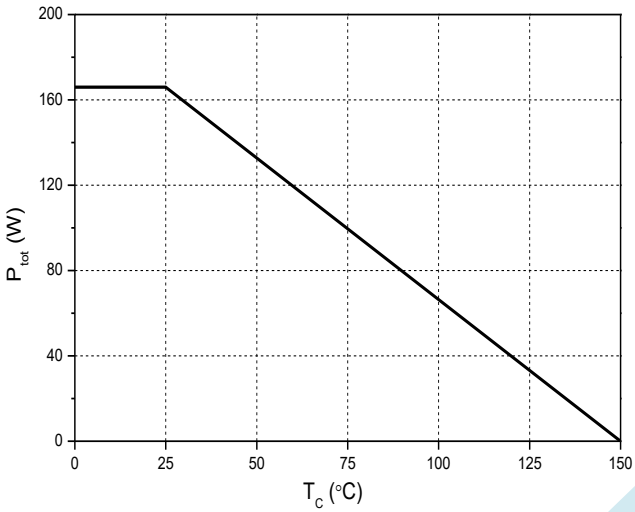


Figure 10. Power Dissipation Derating

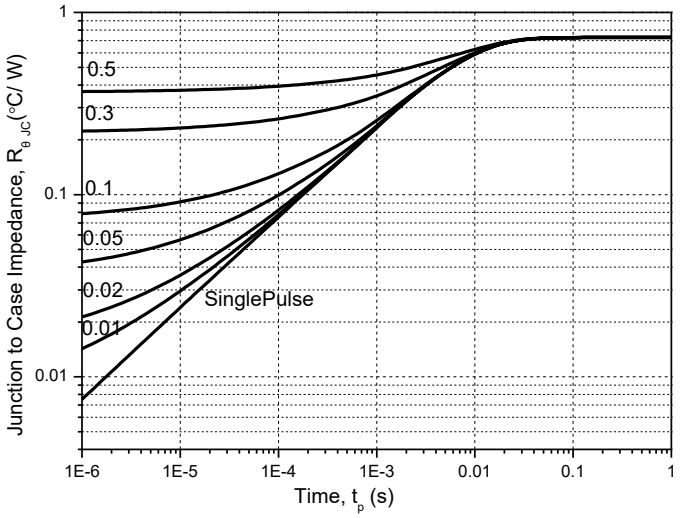
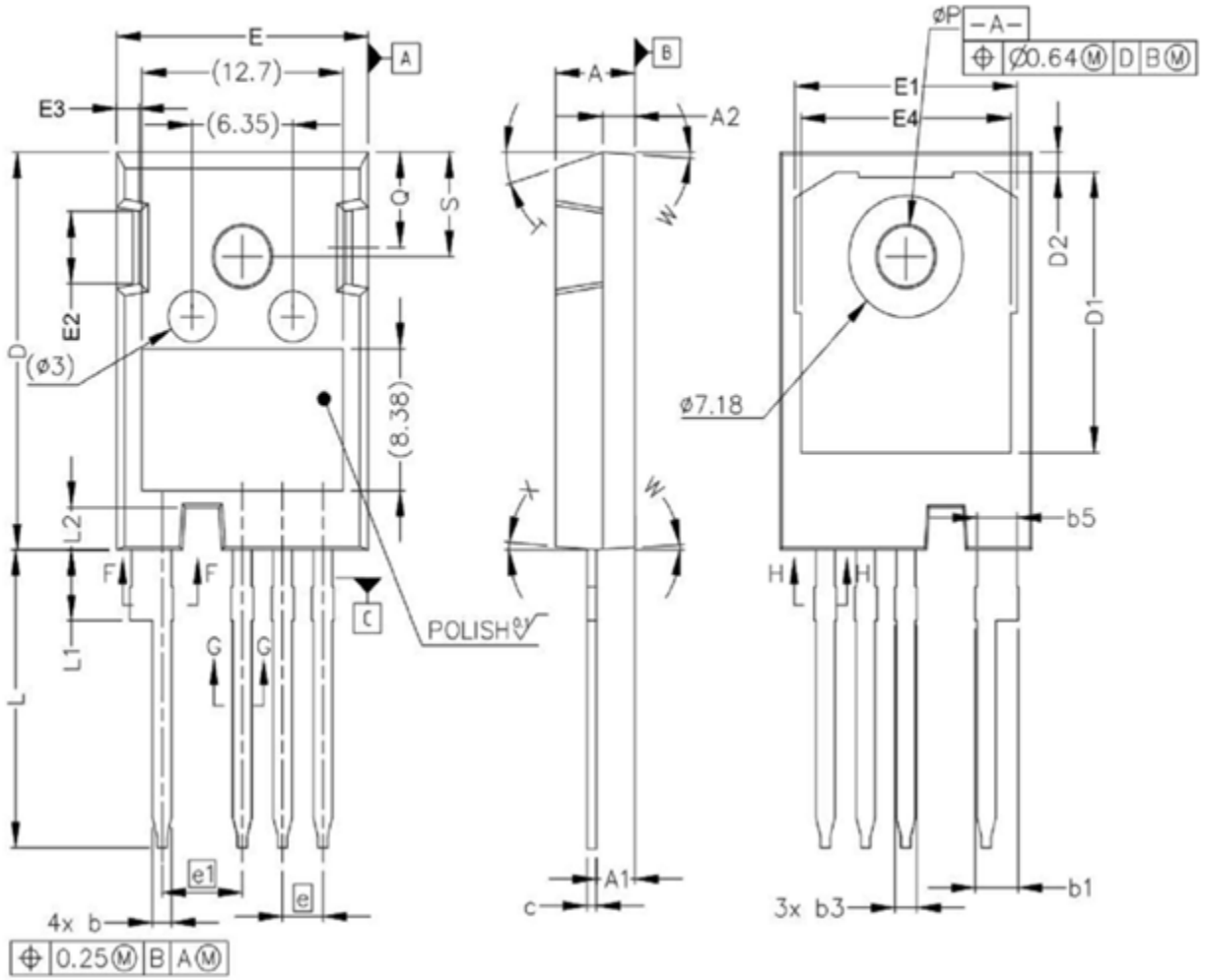


Figure 11. Transient Thermal Impendance

Package Dimensions: TO-247-4L



SYMBOL	Mechanical Dimensions/mm			SYMBOL	Mechanical Dimensions/mm			SYMBOL	Mechanical Dimensions/mm		
	MIN	NOM	MAX						MIN	NOM	MAX
A	4.83	5.00	5.21	D	23.30	23.45	23.60	L1	3.97	4.13	4.37
A1	2.29	2.41	2.54	D1	16.25	16.55	17.65	⌀P	3.51	3.6	3.65
A2	1.91	2.00	2.16	E	15.75	15.90	16.13	W	-	3.5	-
b	1.07	1.20	1.33	E1	13.10	13.65	14.15	X	-	4	-
b1	2.39	2.60	2.94	E2	3.68	5.0	5.1	Q	5.49	5.8	6.0
b2	2.39	-	2.84	e		2.54		S	6.04	6.15	6.30
c	0.55	0.60	0.68	L	17.31	17.45	17.82	T	-	17.5	-