AS1M040120T

N-Channel Silicon Carbide Power MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D@25℃
1200V	55mΩ@20V	60A

Feature

- High Blocking Voltage With Low On-Resistance
- High Speed Switching With Low Capacitance
- Easy to Parallel and Simple to Drive

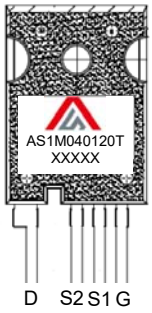
Application

- Power Supplies
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Motor Drivers
- Pulsed Power Applications

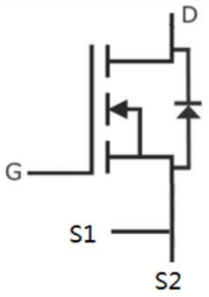
Package

TO-247-4

Marking



Circuit diagram



Absolute maximum ratings (T_C=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Value	Unit
Drain-Source Voltage	V_{DSmax}	V_{GS} = 0V, I_{DS} =100μA	1200	V
Gate-Source Voltage	V_{GSmax}	Absolute maximum values	-10/+25	V
Gate-Source Voltage	V_{GSOP}	Recommended operational values	-5/+20	V
Continuous Drain Current	I_D	V_{GS} = 20V,T_C=25℃	60	A
	I_D	V_{GS} = 20V,T_C=100℃	40	A
Pulsed Drain Current	I_{DM}	Pule width t_p limitea by T_{jmax}	160	A
Power Dissipation	P_D	T_C=25℃,T_J=150℃	330	W
Thermal Resistance	$R_{\theta JC}$	Junction-to-Case	0.34	℃/W
Thermal Resistance	$R_{\theta JA}$	Junction-to-Ambient	40	℃/W
Junction Temperature	T_J		-55 ~ +150	℃
Storage Temperature	T_{STG}		-55~ +150	℃

Electrical characteristics (T_C=25 ºC, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_{DS} =100μA	1200			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =1200V,V_{GS} = 0V			100	μA
Gate-Source leakage current	I_{GSS+}	V_{GS} =25V, V_{DS} = 0V			250	nA
Gate-Source leakage current	I_{GSS-}	V_{GS} =-10V, V_{DS} = 0V			250	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_{DS} =10mA	1.9	2.5	4.0	V
		V_{DS} =V_{GS}, I_{DS} =10mA ,T_J=150℃		1.8		
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =20V, I_D =40A		40	55	mΩ
		V_{GS} =20V, I_D =40A,T_J=150℃		80		
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =1000V,V_{GS} =0V,f =1MHz V_{AC}=25mV		2946		pF
Output Capacitance	C_{oss}			167		
Reverse Transfer Capacitance	C_{rss}			6.6		
C_{OSS} Stored Energy	E_{oss}			92		μJ
Turn-on Switching Energy	E_{on}	V_{DS}=800V,V_{GS}=-5V/20V, I_D =40A,$R_{G(ext)}$=2.5Ω,L=100μH		1.1		mJ
Turn-off Switching Energy	E_{off}			0.85		
Total Gate Charge	Q_g	V_{DS} =800V,V_{GS} =-5V/20V, I_D =40A		142		nC
Gate-Source Charge	Q_{gs}			37		
Gate-Drain Charge	Q_{gd}			18		
Turn-on delay time	$t_{d(on)}$	V_{DS}=800V,V_{GS}=-5V/20V, I_D =40A,$R_{G(ext)}$=2.5Ω, R_L=20Ω		12		nS
Turn-on rise time	t_r			10		
Turn-off delay time	$t_{d(off)}$			25		
Turn-off fall time	t_f			6.2		
Internal Gate Resistance	R_G	f =1MHz, V_{AC}=25mV		2.3		Ω
Source-Drain Diode characteristics						
Diode Forward Current	I_S	T_C=25℃			62	A
Diode Forward voltage	V_{DS}	V_{GS} =-5V, I_F=20A		4.5		V
		V_{GS} =-5V, I_F=20A,T_J=150℃		4.2		
Reverse Recovery Time	t_{rr}	I_{SD}=40A,V_R=800V		41		nS
Reverse Recovery Charge	Q_{rr}			142		nC
Peak Reverse Recovery Current	I_{rrm}			6		A

Typical Characteristics

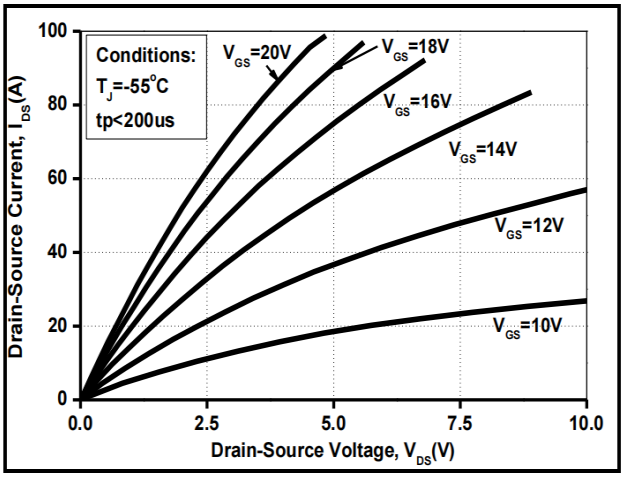


Figure 1. Output Characteristics T_J = -55 °C

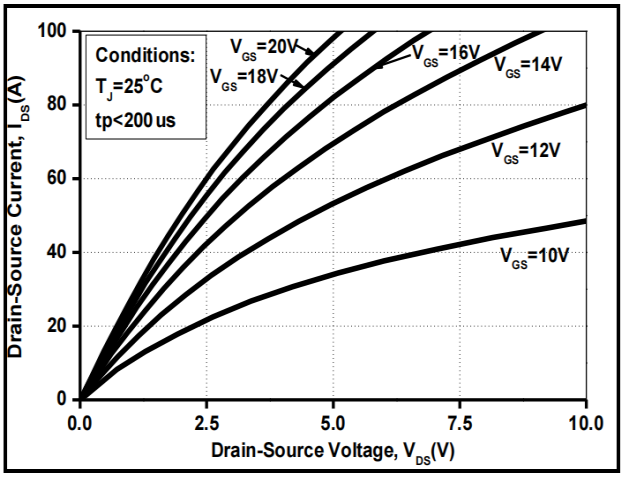


Figure 2. Output Characteristics T_J = 25 °C

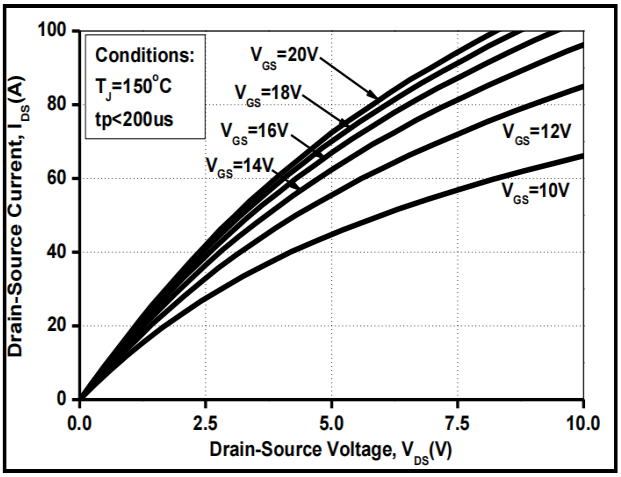


Figure 3. Output Characteristics T_J = 150 °C

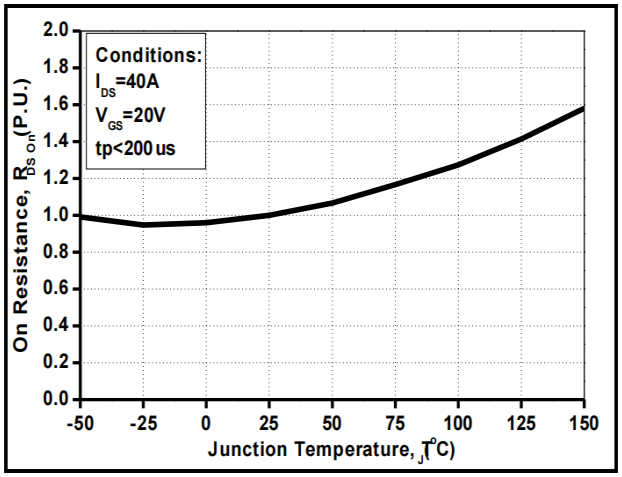


Figure 4. Normalized On-Resistance vs. Temperature

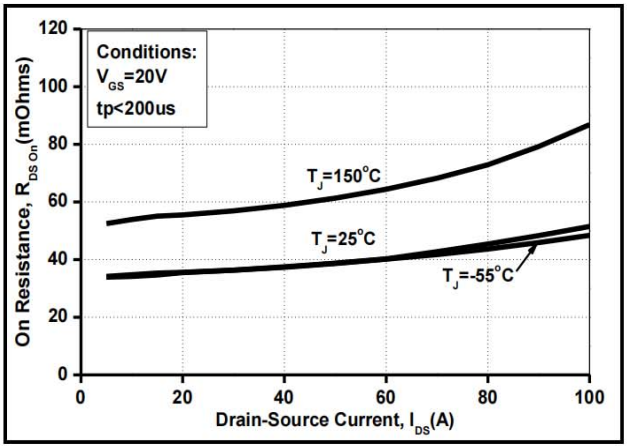


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

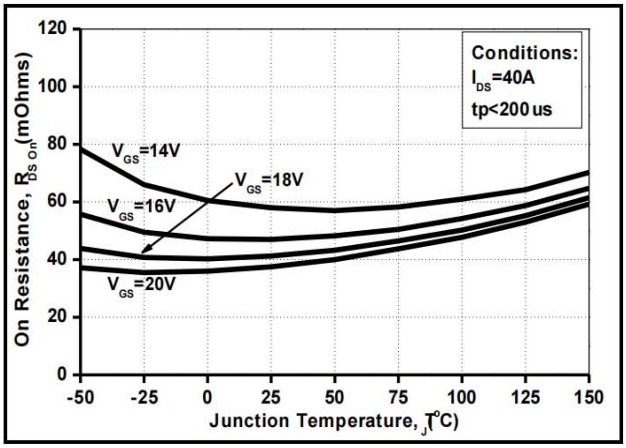


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

Typical Characteristics

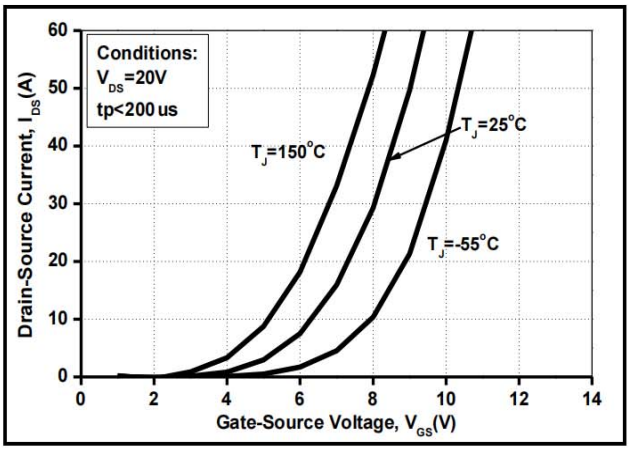


Figure 7. Transfer Characteristic for Various Junction Temperatures

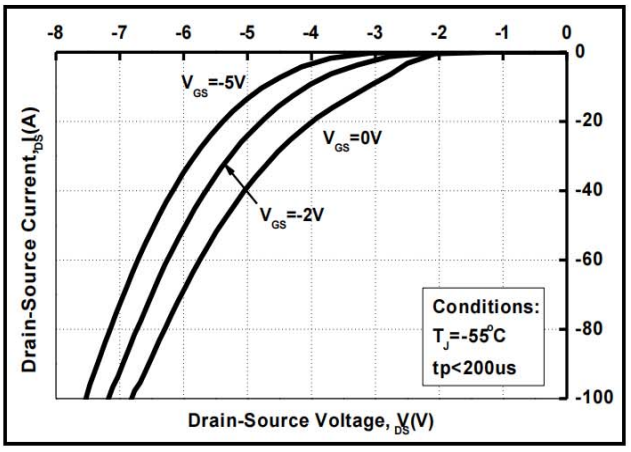


Figure 8. Body Diode Characteristic at -55 °C

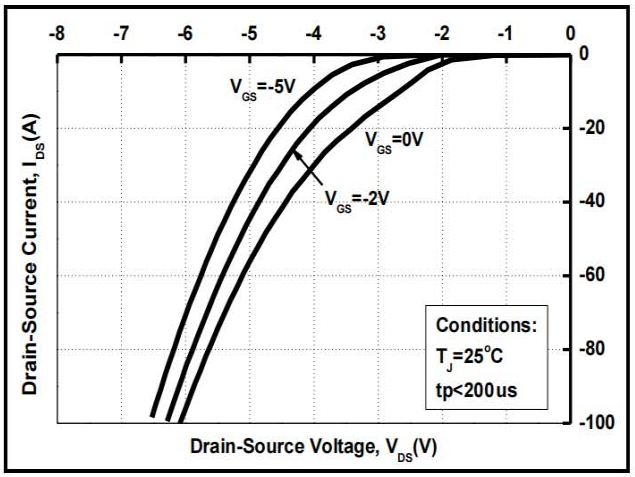


Figure 9. Body Diode Characteristic at 25 °C

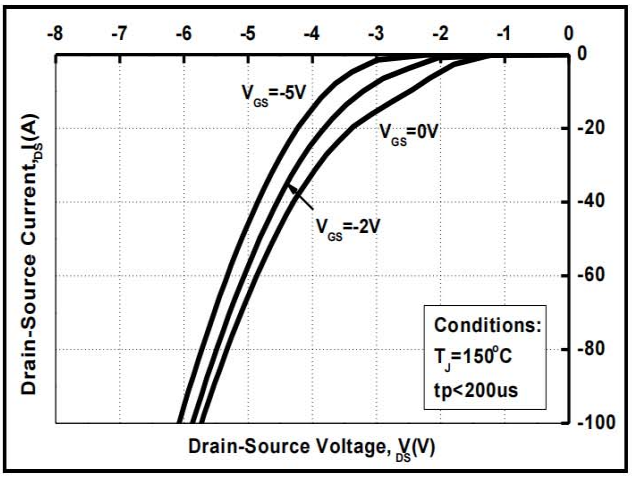


Figure 10. Body Diode Characteristic at 150 °C

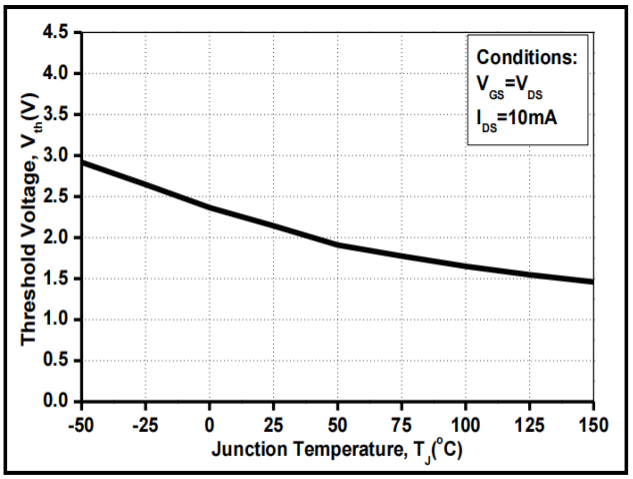


Figure 11. Threshold Voltage vs. Temperature

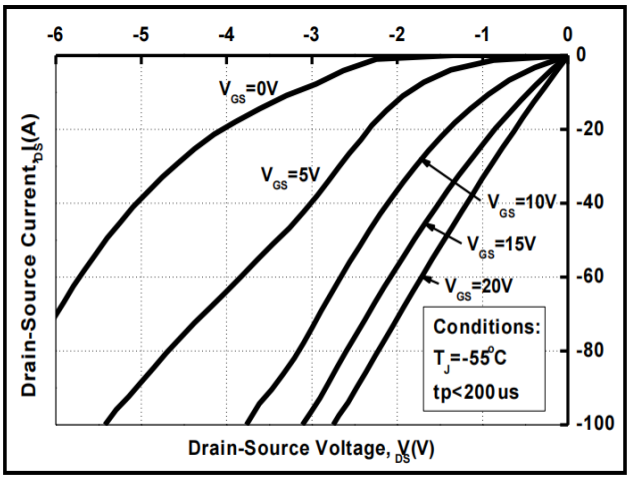


Figure 12. 3rd Quadrant Characteristic at -55 °C

Typical Characteristics

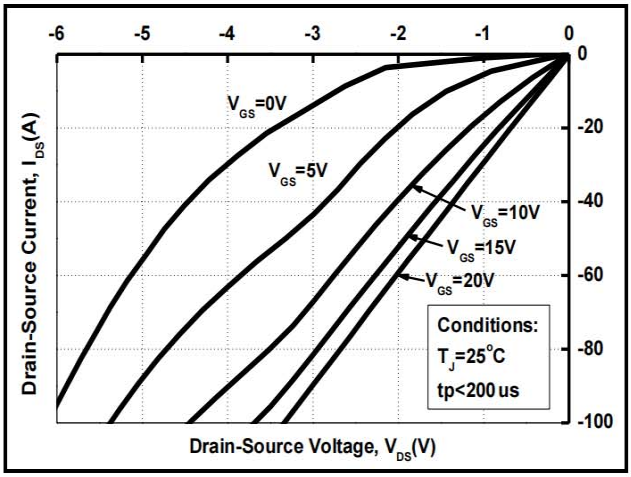


Figure 13. 3rd Quadrant Characteristic at 25 °C

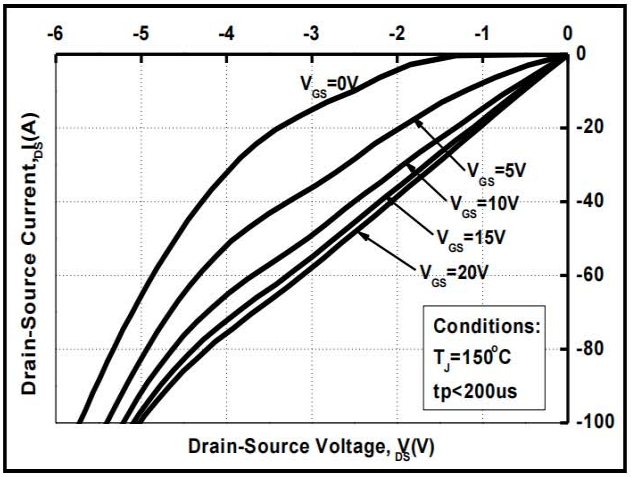


Figure 14. 3rd Quadrant Characteristic at 150 °C

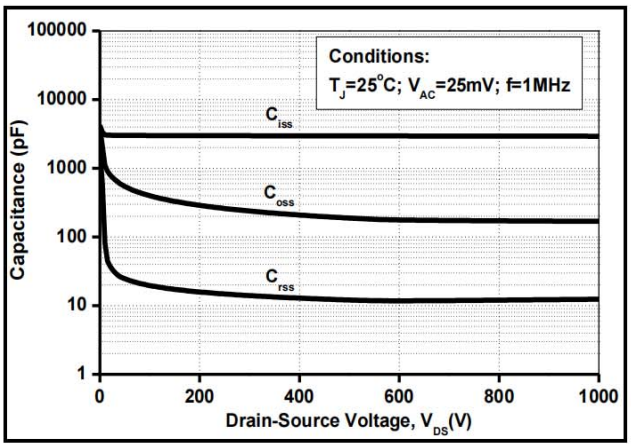


Figure 15. Capacitances vs. Drain-Source Voltage (0 - 200V)

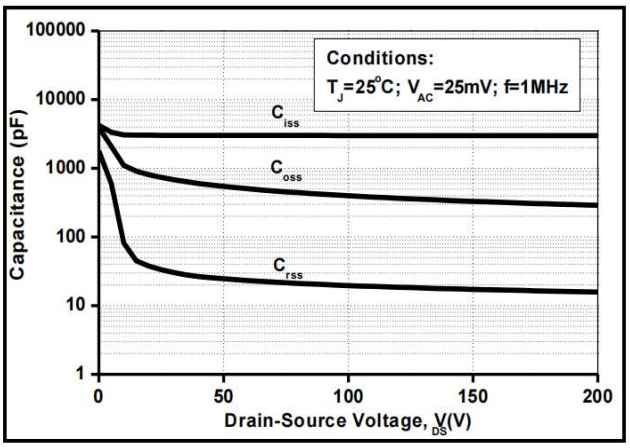
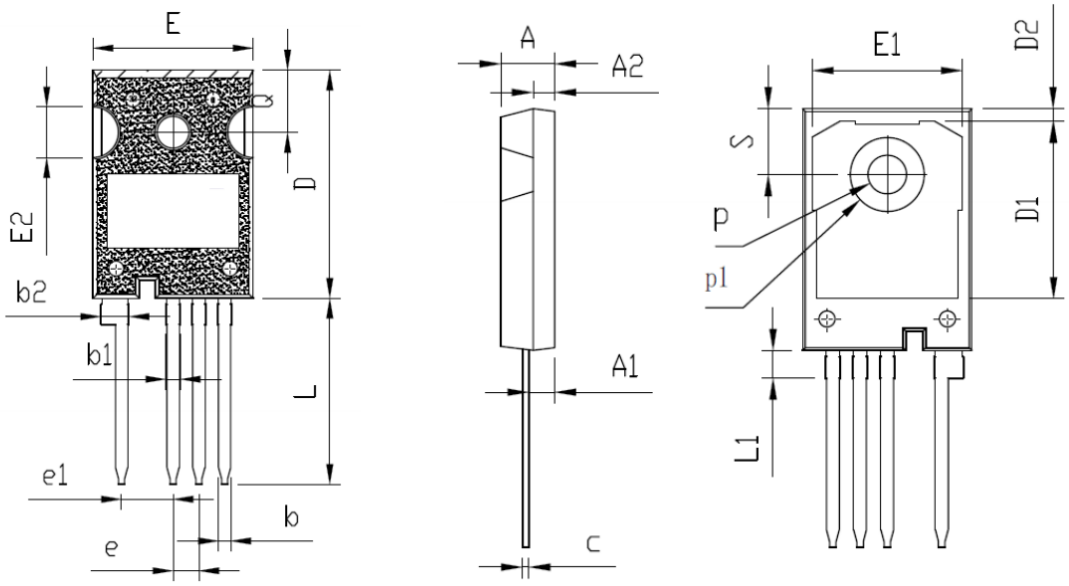


Figure 16. Capacitances vs. Drain-Source Voltage (0 - 1000V)

TO-247-4 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.800	5.250	0.189	0.207
A1	2.250	2.550	0.089	0.100
A2	1.900	2.200	0.075	0.087
b	1.050	1.350	0.041	0.053
b1	1.050	1.600	0.041	0.063
b2	2.350	2.950	0093	0.116
c	0.550	0.700	0.022	0.028
D	23.200	23.800	0.913	0.937
D1	16.250	17.650	0.640	0.695
D2	0.950	1.250	0.037	0.049
E	15.700	16.200	0.618	0.638
E1	13.000	14.200	0.512	0.559
E2	3.650	5.200	0.144	0.205
L	17.300	19.850	0.681	0.781
L1	3.950	4.450	0.156	0.175
Q	5.450	6.300	0.215	0.248
S	6.000	6.300	0.236	0.248
P	3.500	3.650	0.138	0.144
P1	7.180 BSC		0.283 BSC	
e	2.540 BSC		0.100 BSC	
e1	5.080 BSC		0.2000 BSC	