

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D@T_C=25^{\circ}C$
1200V	76m Ω @18V	41A

Hybrid Discrete - 1200V/80mR SiC MOSFET co-packed with 1200V/20A SiC Diodes

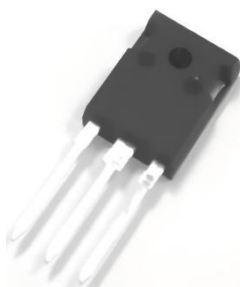
Feature

- Wide bandgap SiC MOSFET technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low reverse recovery(Qrr)

Application

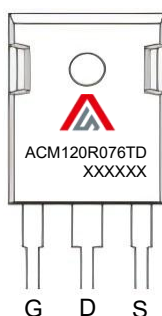
- Switch mode power supplies
- Renewable energy
- On Board Charger
- High voltage DC/DC converters

Package

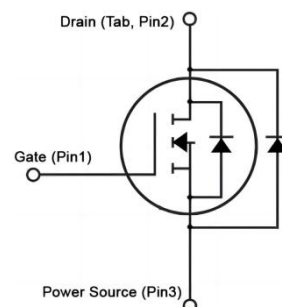


TO-247-3L

Marking



Circuit diagram



Absolute maximum ratings ($T_C=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Test Condition	Value	Unit
Drain-Source Voltage	V_{DSmax}	$V_{GS}=0V, I_D=100\mu A$	1200	V
Gate-Source Voltage	V_{GSmax}	AC ($f > 1Hz$)	-10/+25	V
Gate-Source Voltage	V_{GSOP}	Static	-5/+20	V
Continuous Drain Current	I_D	$V_{GS}=20V$	41	A
		$V_{GS}=20V, T_C=100^{\circ}C$	28	
Pulsed Drain Current	$I_{D,pulse}$	Pulse with t_p limited by T_{jmax} at 1 ms	80	A
		Pulse with t_p limited by T_{jmax} at 100 μs	181	A
Power Dissipation	P_D	$T_J=175^{\circ}C$	208	W
Thermal Resistance (Typ)	$R_{\theta JC}$	Junction to Case	0.72	$^{\circ}C/W$
Junction Temperature	T_J		-55 ~ +175	$^{\circ}C$
Storage Temperature	T_{STG}		-55 ~ +175	$^{\circ}C$

Electrical characteristics (T_J=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =100μA	1200			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =1200V, V _{GS} =0V		1	50	μA
Gate-Source leakage current	I _{GSS}	V _{GS} =20V, V _{DS} =0V			250	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =5mA		3		V
		V _{DS} =V _{GS} , I _D =5mA ,T _J =175℃		2		
Drain-source on-resistance	R _{DS(on)}	V _{GS} =20V, I _D =20A		68	90	mΩ
		V _{GS} =18V, I _D =20A		76	100	
		V _{GS} =20V, I _D =20A, T _J =175℃		120		
		V _{GS} =18V, I _D =20A, T _J =175℃		125		
Transconductance	g _{fs}	V _{DS} =20V, I _D =20A		16		S
		V _{DS} =20V, I _D =20A, T _J =175℃		14		
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} =1000V, V _{GS} =0V, f =1MHz V _{AC} =25mV		1380		pF
Output Capacitance	C _{oss}			130		
Reverse Transfer Capacitance	C _{rss}			3		
Internal Gate Resistance	R _{G(int)}	f =1MHz, V _{AC} =25mV		1.4		Ω
Total Gate Charge	Q _g	V _{DS} =800V, V _{GS} =-5V/20V I _D =20A		54		nC
Gate-Source Charge	Q _{gs}			19		
Gate-Drain Charge	Q _{gd}			22		
Source-Drain Diode characteristics						
Diode Forward Current	I _S	V _{GS} =-4V, T _C =25℃		35		A
Diode Forward voltage	V _{SD}	V _{GS} =-4V, I _{SD} =10A		1.2		V
		V _{GS} =-4V, I _{SD} =10A, T _J =175℃		1.5		

Typical Characteristics

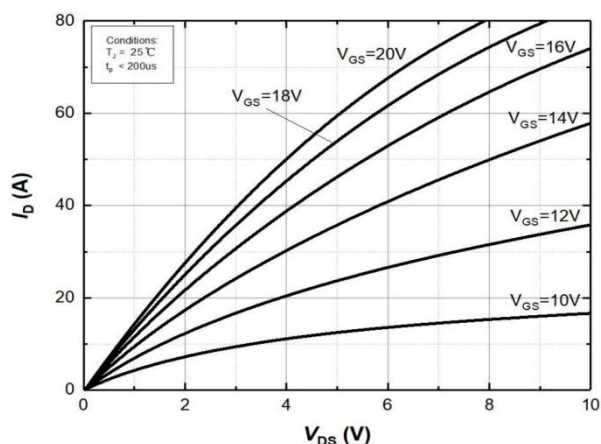


Figure 1. Output characteristics at $T_j=25^\circ\text{C}$

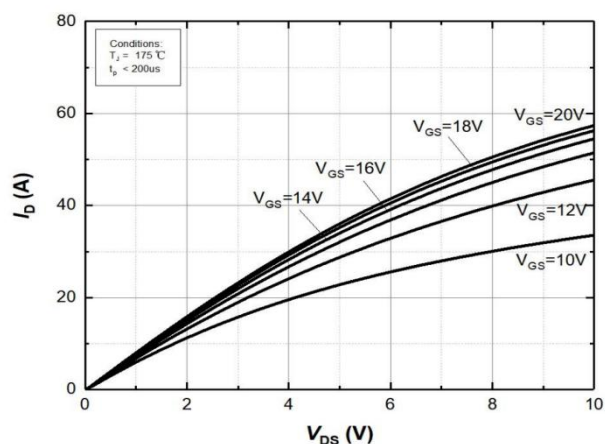


Figure 2. Output characteristics at $T_j=175^\circ\text{C}$

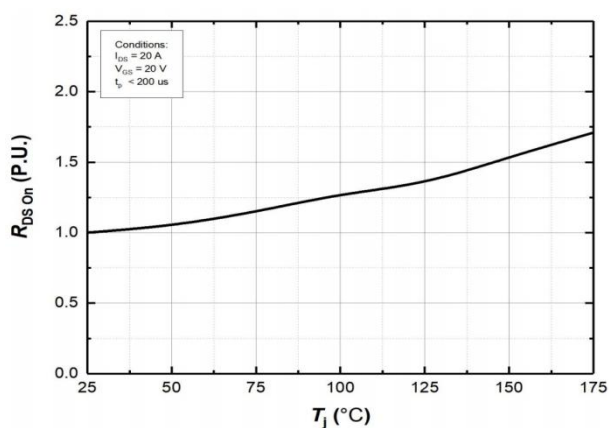


Figure 3. Normalized On-Resistance vs. Temperature

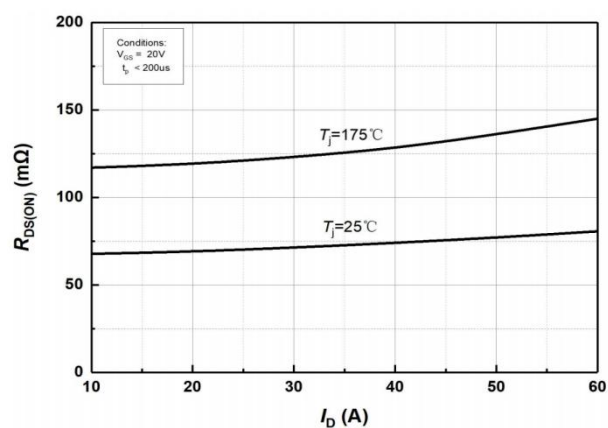


Figure 4. On-Resistance vs. Drain current for Various Temperature

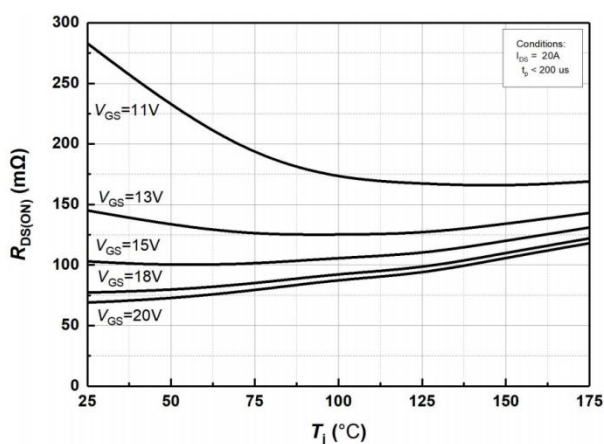


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

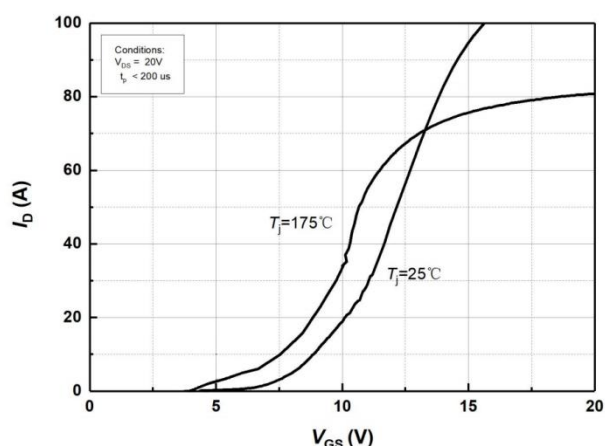


Figure 6. Transfer Characteristics for Various Junction Temperatures

Typical Characteristics

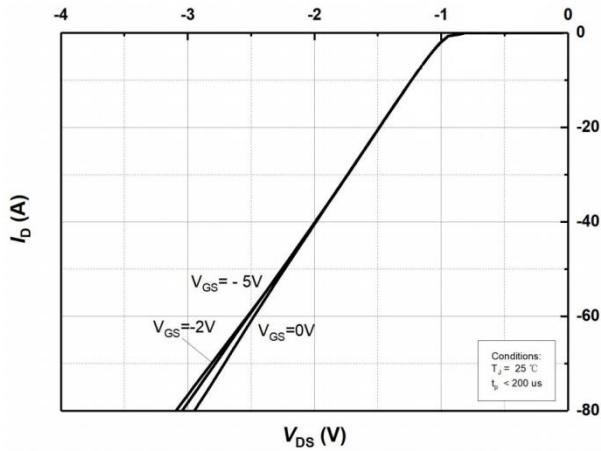


Figure 7. Body Diode Characteristics at $T_j=25^{\circ}\text{C}$

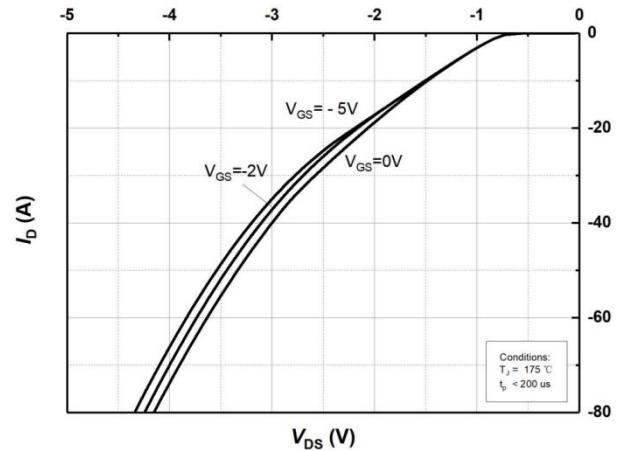


Figure 8. Body Diode Characteristics at $T_j=175^{\circ}\text{C}$

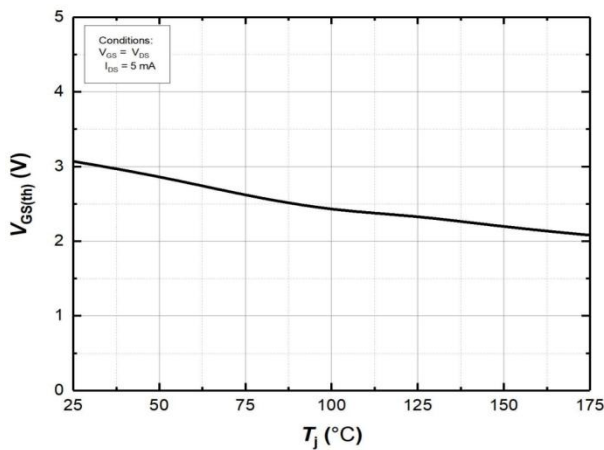


Figure 9. Threshold Voltage vs. Temperature

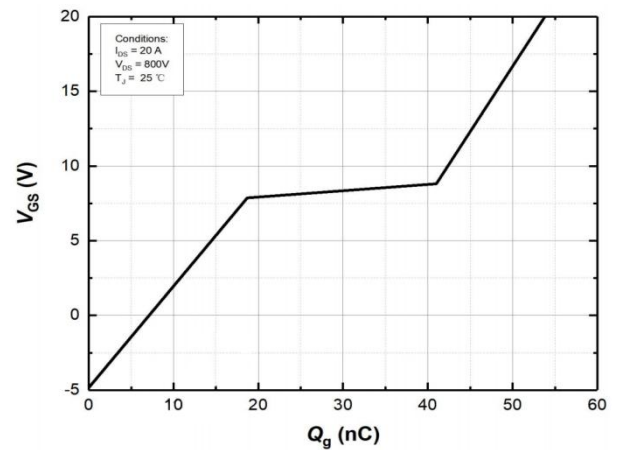


Figure 10. Gate Charge Characteristics

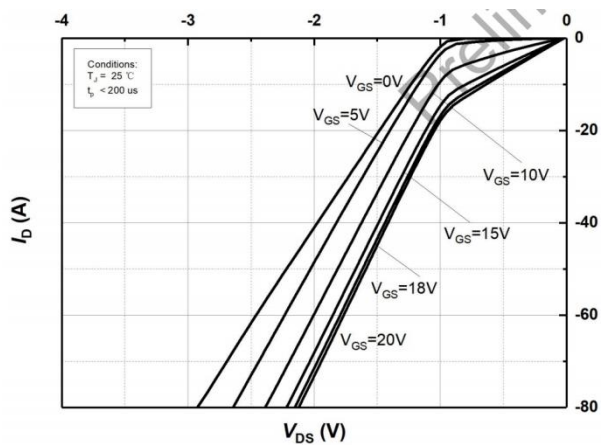


Figure 11. 3rd Quadrant Characteristic at $T_j=25^{\circ}\text{C}$

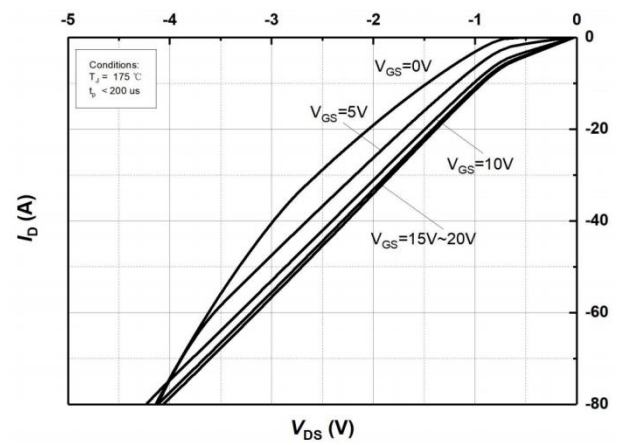


Figure 12. 3rd Quadrant Characteristic at $T_j=175^{\circ}\text{C}$

Typical Characteristics

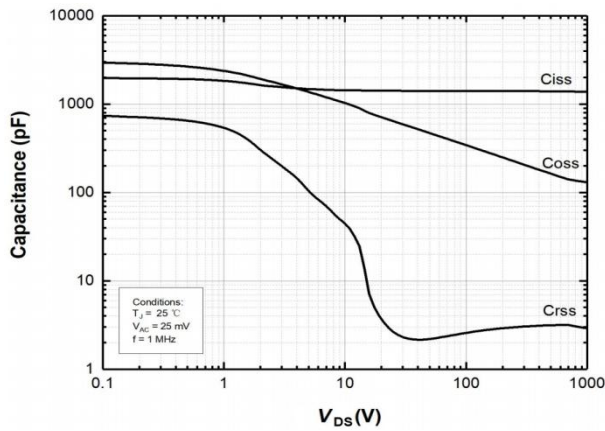


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 1000V)

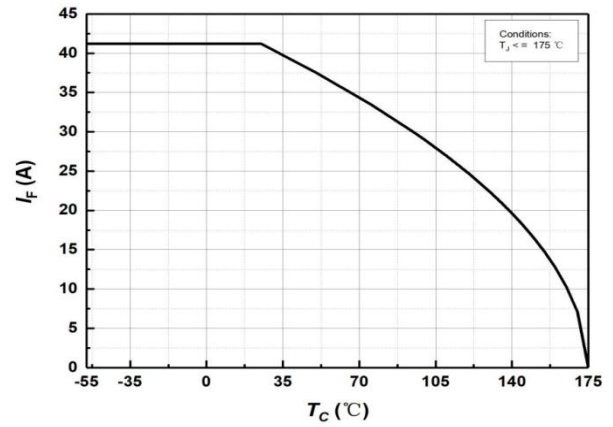


Figure 14. Continuous Drain Current Derating vs Case Temperature

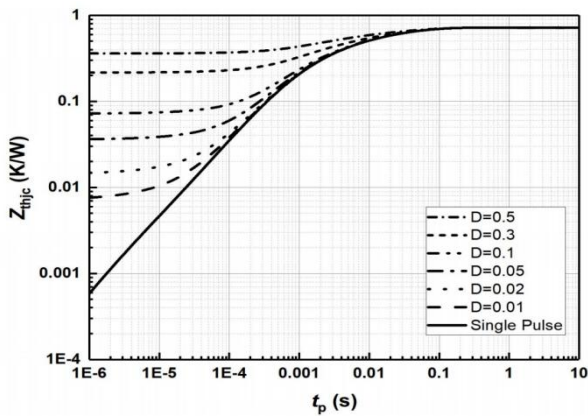


Figure 15. Transient Thermal Impedance (Junction – Case)

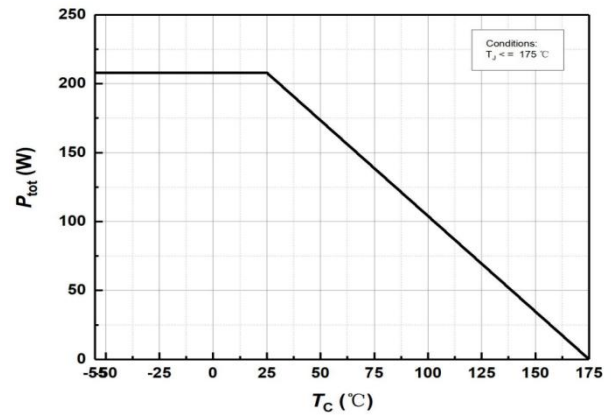


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

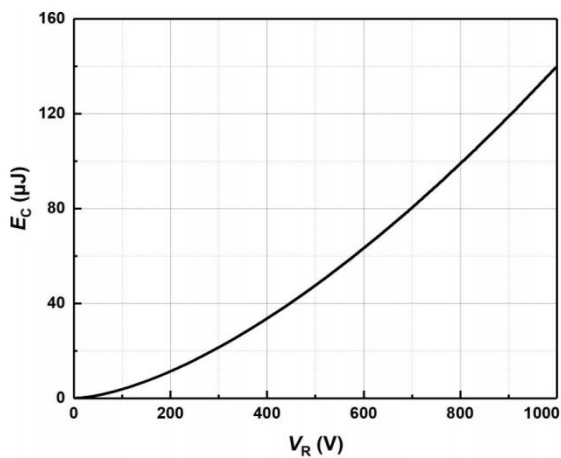


Figure 17. Output Capacitor Stored Energy

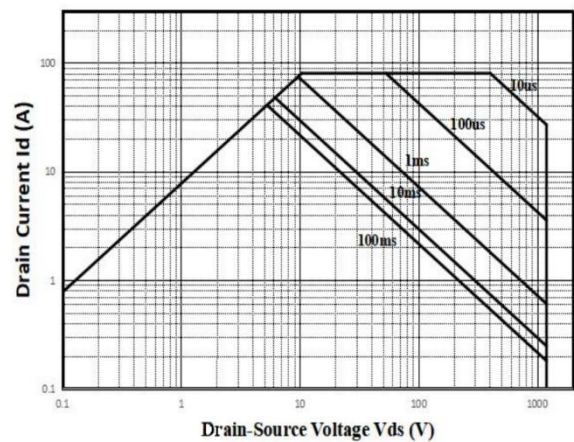
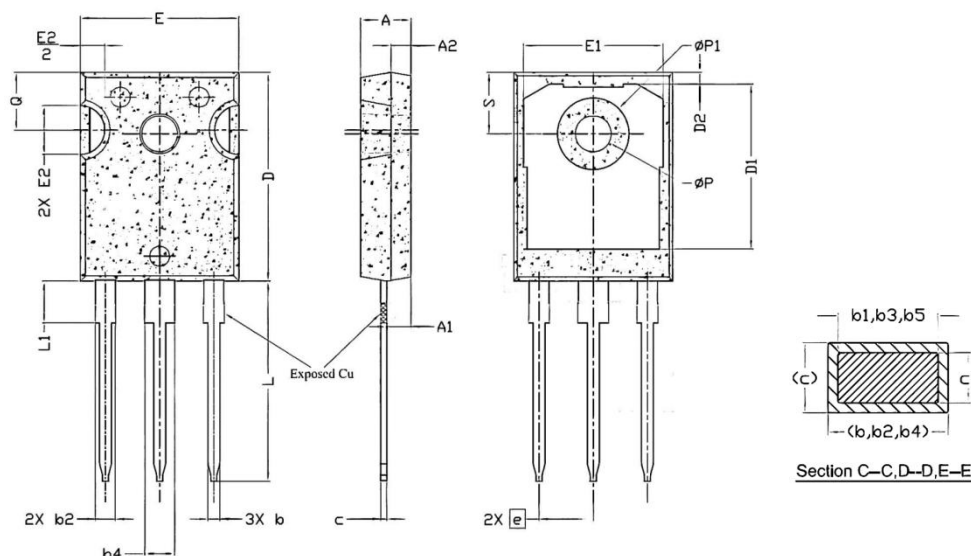


Figure 18. Safe Operating Area

TO-247-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.830	5.210	0.190	0.205
A1	2.290	2.550	0.090	0.100
A2	1.500	2.490	0.059	0.098
b	1.120	1.330	0.044	0.052
b1	1.120	1.280	0.044	0.050
b2	1.910	2.390	0.075	0.094
b3	1.910	2.340	0.075	0.092
b4	2.870	3.220	0.113	0.127
b5	2.870	3.180	0.113	0.125
c	0.550	0.690	0.022	0.027
c1	0.550	0.650	0.022	0.026
D	20.800	21.100	0.819	0.831
D1	16.250	17.650	0.640	0.695
D2	0.510	1.350	0.020	0.053
E	15.750	16.130	0.620	0.635
E1	13.460	14.160	0.530	0.557
E2	4.320	5.490	0.170	0.216
e	5.440 BSC		0.214 BSC	
L	19.810	20.320	0.780	0.800
L1	4.100	4.400	0.161	0.173
ØP	3.560	3.650	0.140	0.144
ØP1	7.19 REF.		0.283 REF.	
Q	5.390	6.200	0.212	0.244
S	6.040	6.300	0.238	0.248