

1200V Planar SiC Power MOSFET

Features

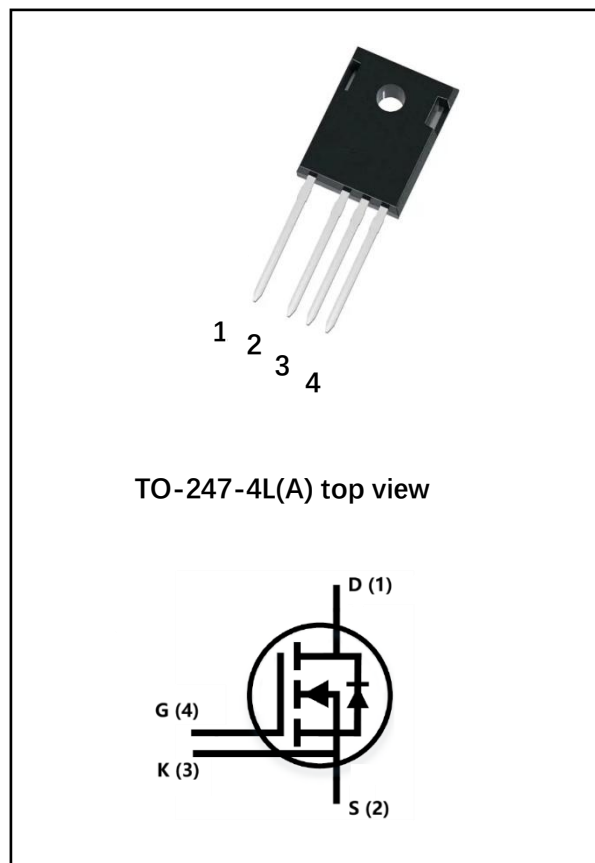
- Wide Bandgap SiC MOSFET Technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed Switching
- Low Reverse Recovery (Qrr)
- Easy to Parallel and Simple to Drive

Benefits

- Reduced Switching Losses
- Increased System Switching Frequency
- Increased Power Density
- Reduction of Heat Sink Requirements
- Reduced EMI

Application

- Power Factor Correction Modules
- Switch Mode Power Supplies
- DC-AC Inverters
- High Voltage DC/DC Converters



Parameter		Value	Unit
V_{DS}		1200	V
$R_{DS(on_typ.)}$	$V_{GS}=18V$	40	mΩ
I_D		68	A

Maximum ratings at $T_j=25^{\circ}\text{C}$, Unless otherwise specified

Parameter	Symbol	Test Condition	Value	Unit
Drain to Source Voltage	V_{DS}	$V_{GS} = 0V, I_D = 100\mu A$	1200	V
Gate to Source Voltage	V_{GS}	Absolute maximum values	-10/+22	V
Recommended Operation Voltage of Gate to Source	V_{GSop}	Recommended operational values	-4/+18	V
Continuous Drain Current	I_D	$V_{GS}=18V, T_C=25^{\circ}\text{C}$	68	A
		$V_{GS}=18V, T_C=100^{\circ}\text{C}$	59	
Pulsed Drain Current	I_{DM}	Pulse with T_p limited by T_{jmax}	135	A
Power Dissipation	P_{tot}	$T_C=25^{\circ}\text{C}, T_j=175^{\circ}\text{C}$	283	W
Operating and Storage Temperature	T_j, T_{stg}		-55 to +175	$^{\circ}\text{C}$

Thermal Characteristics

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Thermal Resistance from Junction to Case	$R_{th(j-c)}$	-	0.529	-	$^{\circ}\text{C/W}$

Electrical Characteristics
Static Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=500\mu A$	1200			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=9mA, T_j=25^{\circ}\text{C}$	2		4	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS}=0V, V_{DS}=1200V$	-		10	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS}=18V, V_{DS}=0V$	-		100	nA
Drain to Source on Resistance	$R_{DS(on)}$	$V_{GS}=18V, I_D=40A$	-	40	52	m Ω
		$V_{GS}=18V, I_D=40A, T_j=175^{\circ}\text{C}$		62		

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=800V, f=1MHz,$ $T_j=25^{\circ}C$		1860		pF
Output Capacitance	C_{oss}			75		
Reverse Transfer Capacitance	C_{rss}			7		
Total Gate Charge	Q_g	$V_{GS}=-4/18V, V_{DS}=800V, I_D=40A,$ $T_j=25^{\circ}C$		80		nC
Gate-Source Charge	Q_{gs}			3		
Gate-Drain Charge	Q_{gd}			13		
Gate Resistance	R_g	$V_{AC}=25mV, f=1MHz$		2		Ω

Switching Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=-4/18V, V_{DD}=800V,$ $I_D=40A, R_g=10\Omega$		13		ns
Rise Time	t_r			30		
Turn-Off Delay Time	$t_{d(off)}$			35		
Fall Time	t_f			10		
Turn-On Energy	E_{on}			265		μJ
Turn-Off Energy	E_{off}			45		

Reverse Diode Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_{SD}	$V_{GS}=-4V, I_{SD}=20A, T_j=25^{\circ}C$	-	4.5		V
Continuous Diode Forward Current	I_S	$V_{GS}=-4V, T_j=25^{\circ}C$		68		A
Reverse Recovery Time	t_{rr}	$V_{GS}=-4V, I_{SD}=40A,$ $V_R=800V, di/dt=800A/\mu s, T_j=25^{\circ}C$		28		ns
Reverse Recovery Charge	Q_{rr}			83		nC
Peak Reverse Recovery Current	I_{rrm}			5.3		A

Typical Performance

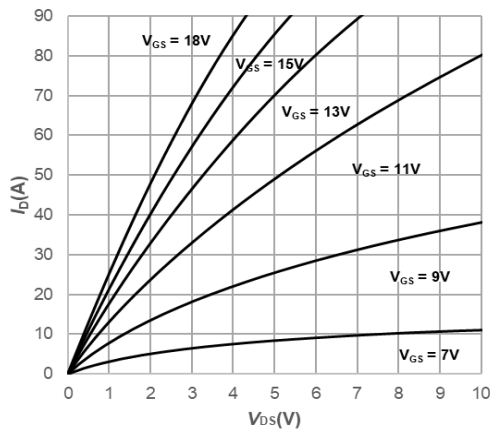


Fig1. Output Characteristics $T_j = 25^\circ\text{C}$

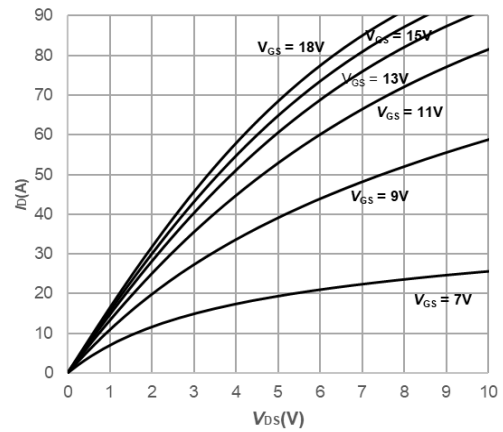


Fig2. Output Characteristics $T_j = 175^\circ\text{C}$

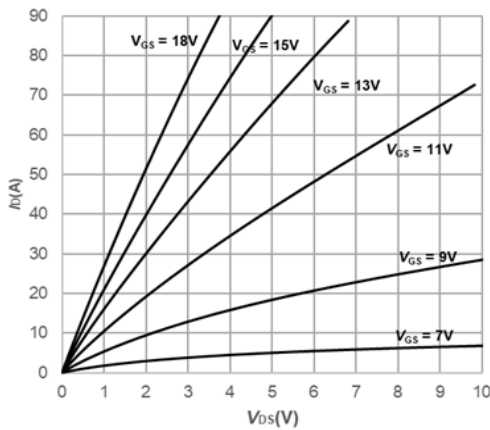


Fig3. Output Characteristics $T_j = -55^\circ\text{C}$

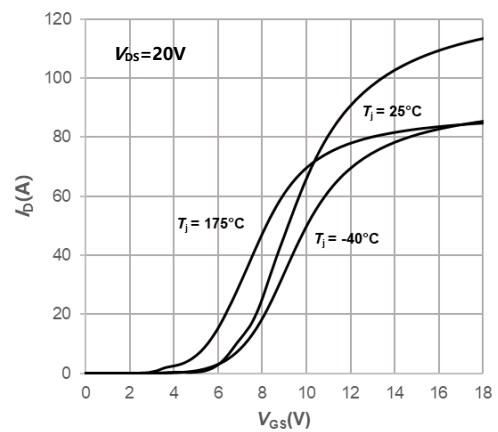


Fig4. Typical Transfer Characteristics

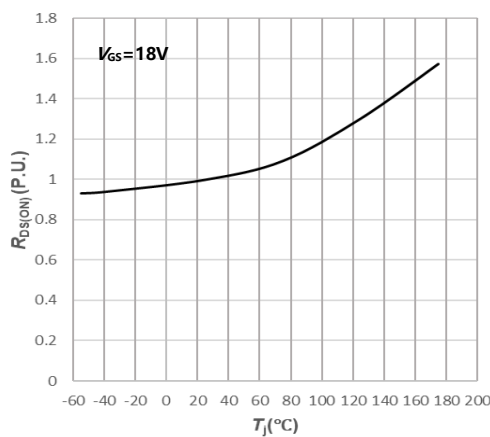


Fig5. Normalized On-Resistance vs. Temperature

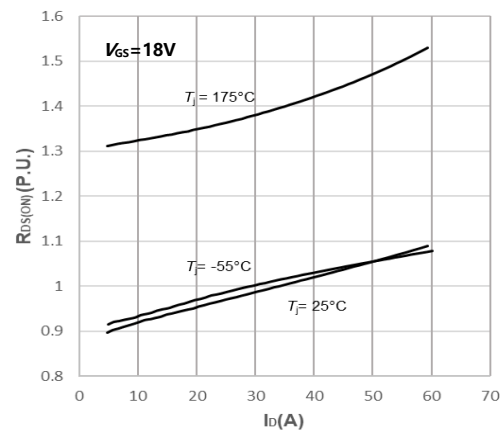


Fig6. Normalized On-Resistance vs. Drain Current for Various Temperatures

Typical Performance

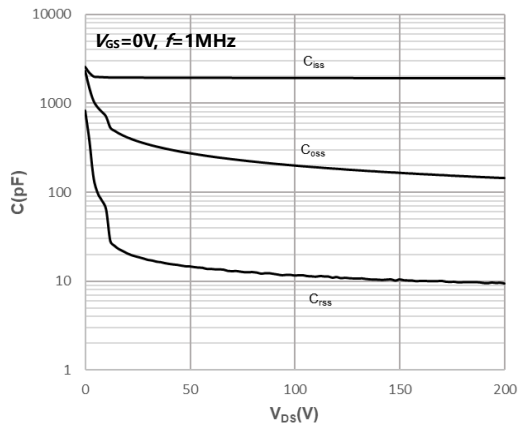


Fig7. Capacitances vs. Drain-Source Voltage (0-200V)

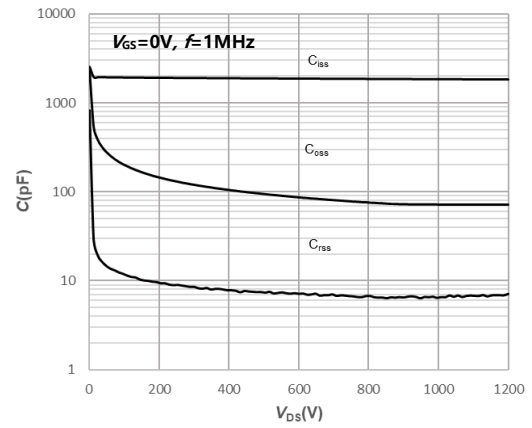


Fig8. Capacitances vs. Drain-Source Voltage (0-1200V)

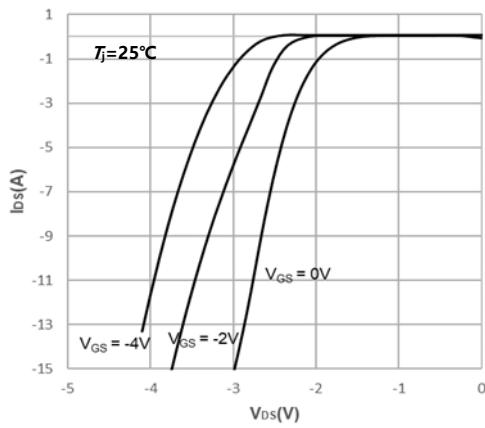


Fig9. Body Diode Characteristics

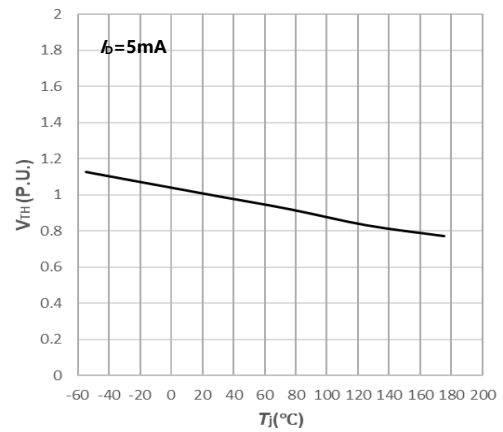
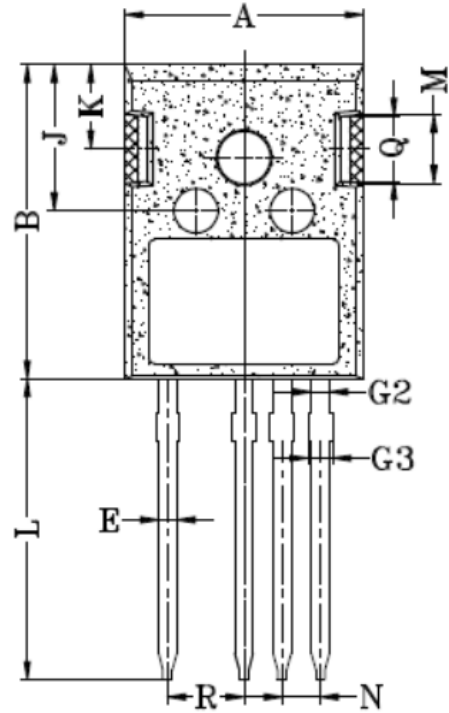
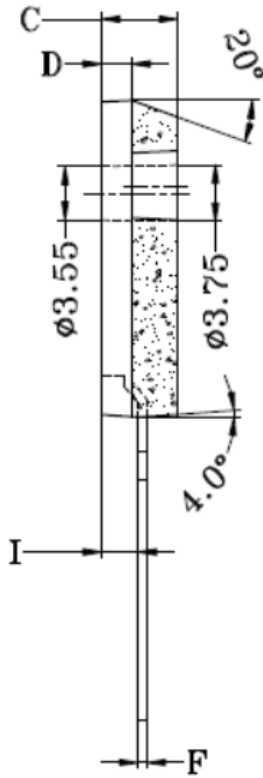


Fig10. Normalized Threshold Voltage vs. Temperature

TO-247-4L(A) Package Dimensions



Symbol	Dimensions in Millimeter	
	MIN	MAX
A	15.80	16.00
B	20.90	21.10
C	4.90	5.10
D	1.90	2.10
E	1.10	1.30
F	0.50	0.70
G2	1.10	1.30
G3	1.18	1.38
H	4.18	4.38
I	2.30	2.50
J	9.65	9.85
K	5.54	5.74
L	19.80	20.20
M	4.50	4.70
N	2.34	2.74
ϕP	3.40	3.60
Q	4.232	4.432
R	4.88	5.28

