

1200V Planar SiC Power MOSFET

Features

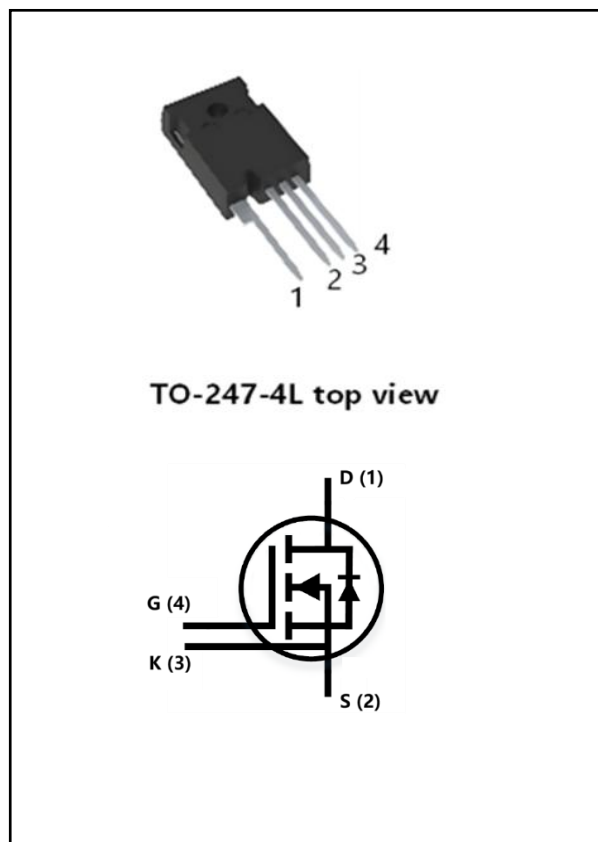
- Wide Bandgap SiC MOSFET Technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed Switching
- Low Reverse Recovery (Qrr)
- Easy to Parallel and Simple to Drive

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
$R_{DS(on)_{typ.}}$	$V_{GS}=18V$	80	mΩ
I_D		36	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}	$V_{GS} = 0\text{V}$, $I_D = 100\mu\text{A}$	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	$V_{GS}=18\text{V}$, $T_C=25^{\circ}\text{C}$	36	A
		$V_{GS}=18\text{V}$, $T_C=100^{\circ}\text{C}$	25	
Pulsed Drain Current	I_{DM}	Pulse with T_p limited by T_{jmax}	80	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	$V_{(BR)DSS}$	$V_{GS}=0\text{V}$, $I_D=500\mu\text{A}$	1200			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}$, $I_D=5\text{mA}$, $T_j=25^{\circ}\text{C}$	2		4	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS}=0\text{V}$, $V_{DS}=1200\text{V}$			10	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS}=18\text{V}$, $V_{DS}=0\text{V}$			100	nA
Drain to Source on Resistance	$R_{DS(on)}$	$V_{GS}=18\text{V}$, $I_D=20\text{A}$		80	104	m Ω
		$V_{GS}=18\text{V}$, $I_D=20\text{A}$, $T_j=175^{\circ}\text{C}$		122		

Dynamic Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=800V, f=1MHz, T_j=25^{\circ}C$		944		pF
Output Capacitance	C_{oss}			42.6		
Reverse Transfer Capacitance	C_{rss}			4.1		
Total Gate Charge	Q_g	$V_{GS}=-4/18V, V_{DS}=800V, I_D=20A, T_j=25^{\circ}C$		51		nC
Gate-Source Charge	Q_{gs}			13		
Gate-Drain Charge	Q_{gd}			25		
Gate Resistance	R_g	$V_{AC}=25mV, f=1MHz$		4		Ω

Switching Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=-4/18V, V_{DD}=800V, I_D=20A, R_g=10\Omega$		38		ns
Rise Time	t_r			46		
Turn-Off Delay Time	$t_{d(off)}$			32		
Fall Time	t_f			41		
Turn-On Energy	E_{on}			1080		μJ
Turn-Off Energy	E_{off}			49		

Reverse Diode Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_{SD}	$V_{GS}=-4V, I_{SD}=10A, T_j=25^{\circ}C$	-	4.5		V
Continuous Diode Forward Current	I_S	$V_{GS}=-4V, T_j=25^{\circ}C$		36		A
Reverse Recovery Time	t_{rr}	$V_{GS}=-4V, I_{SD}=20A, V_R=800V, di/dt=800A/us, T_j=25^{\circ}C$		17.5		ns
Reverse Recovery Charge	Q_{rr}			71.4		nC
Peak Reverse Recovery Current	I_{rrm}			6.8		A

Typical Performance

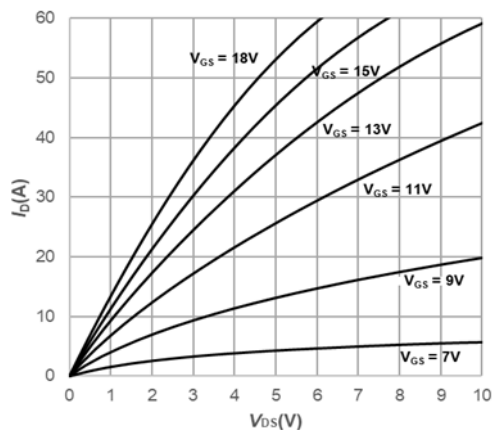


Fig1. Output Characteristics $T_j = 25^\circ\text{C}$

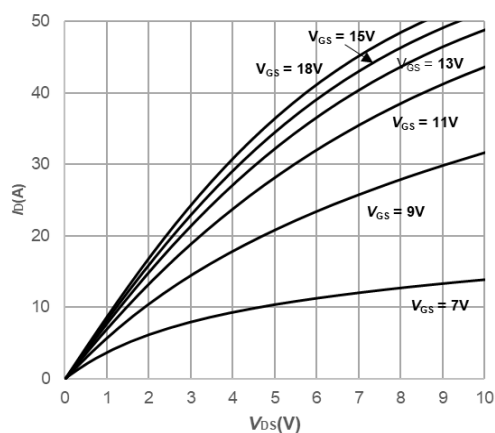


Fig2. Output Characteristics $T_j = 175^\circ\text{C}$

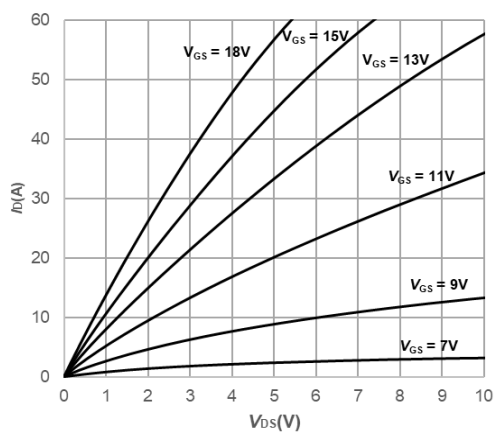


Fig3. Output Characteristics $T_j = -55^\circ\text{C}$

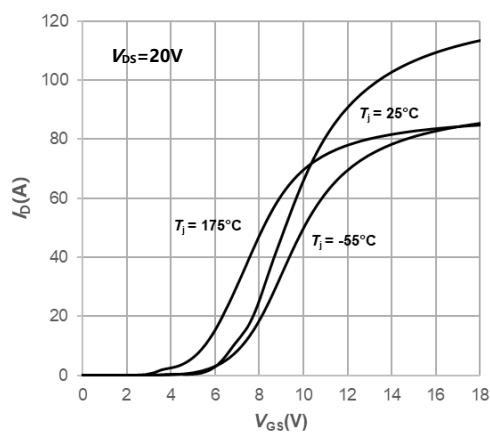


Fig4. Typical Transfer Characteristics

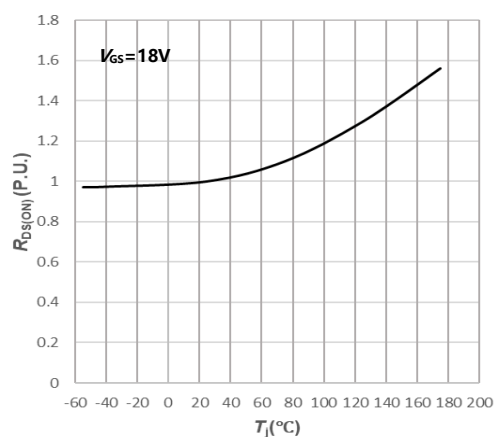


Fig5. Normalized On-Resistance vs. Temperature

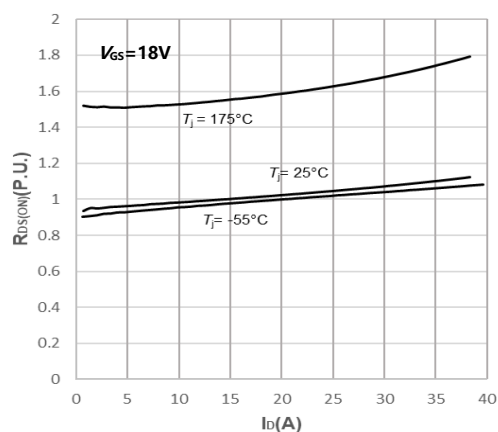


Fig6. Normalized On-Resistance vs. Drain Current for Various Temperatures

Typical Performance

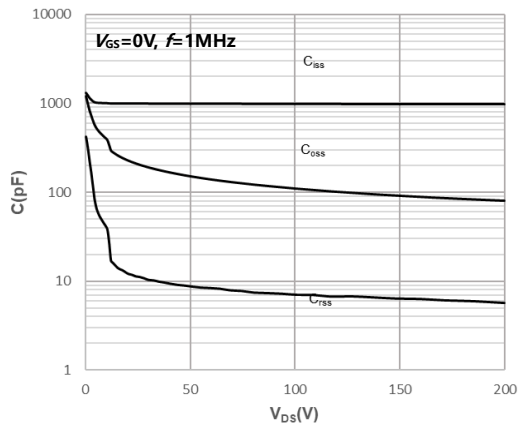


Fig7. Capacitances vs. Drain-Source Voltage (0-200V)

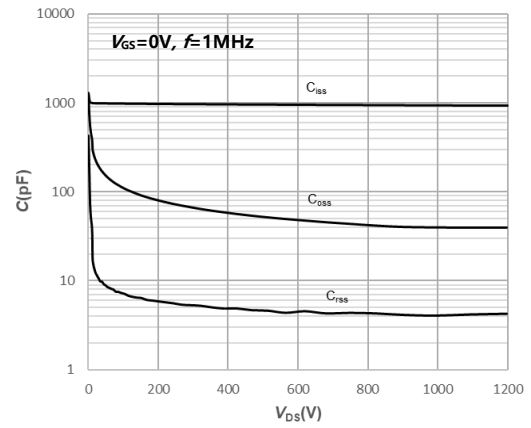


Fig8. Capacitances vs. Drain-Source Voltage (0-1200V)

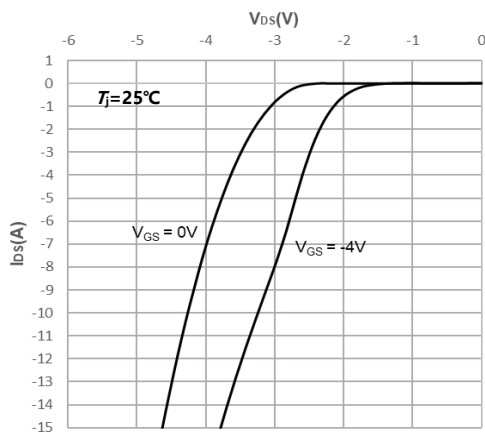


Fig9. Body Diode Characteristics

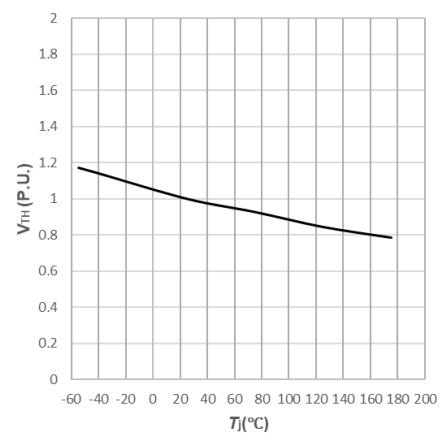


Fig10. Normalized Threshold Voltage vs. Temperature

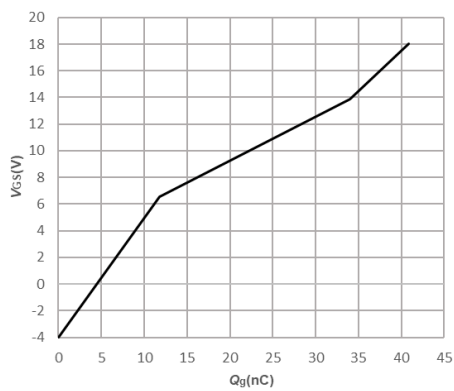
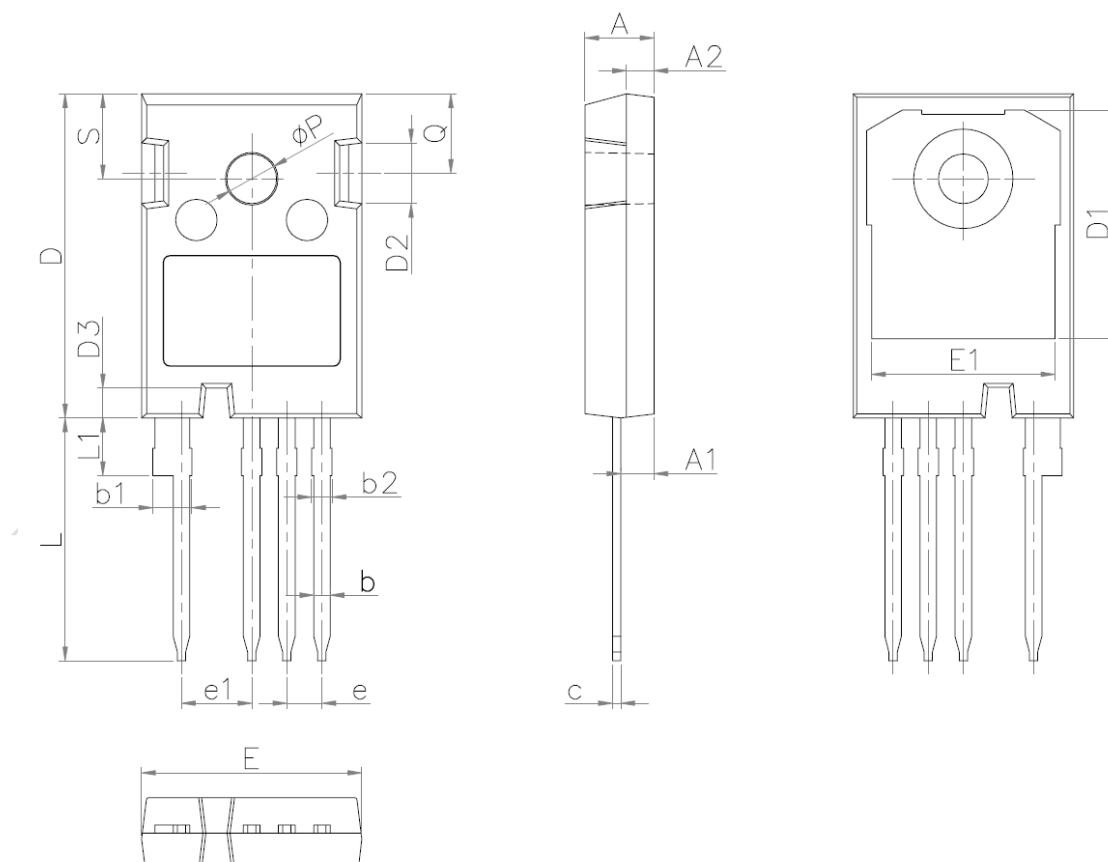


Fig11. Gate Charge Characteristics

TO-247-4L Package Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.830	5.210	0.190	0.205
A1	2.290	2.540	0.090	0.100
A2	1.910	2.160	0.075	0.085
b	1.070	1.330	0.042	0.052
b1	2.390	2.940	0.094	0.116
b2	1.070	1.600	0.042	0.063
c	0.550	0.680	0.022	0.027
D	23.300	23.600	0.917	0.929
D1	16.350	16.750	0.644	0.659
D2	3.680	5.100	0.145	0.201
D3	2.350	2.650	0.093	0.104
E	15.750	16.130	0.620	0.635
E1	13.110	13.410	0.516	0.528
e	2.54 BSC		0.1 BSC	
e1	5.08 BSC		0.2 BSC	
L	17.310	17.820	0.681	0.702
L1	3.970	4.370	0.156	0.172
P	3.510	3.650	0.138	0.144
Q	5.49	6	0.216	0.236
S	6.150 BSC.		0.242 BSC	