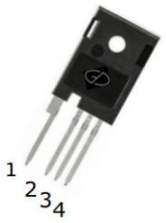
N-Channel 1500V (D-S) SiC MOSFET

Features

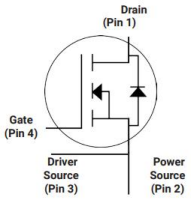
- Wide bandgap SiC MOSFET technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low reverse recovery(Qrr)
- Halogen free, RoHs compliant



TO-247-4L

Applications

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



Absolute Maximum Ratings (T_J=25°C unless otherwise noted)

Parameter		Symbol	Ratings	Unit
Drain Source Voltage		V_{DS}	1500	V
Gate Source Voltage		V_{GS}	-8/+22	V
Recommend Gate Source Voltage		V_{GSop}	-4/+18	V
Drain Current Continuous V_{GS}=18V	T_C=25°C	I_D	57	A
	T_C=125°C		33	
Power Dissipation	T_C=25°C	P_D	300	W
Operating Temperature and Storage Temperature Range		T_J/T_{STG}	-55 to +175	°C

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance Junction to Case	R_{thJC}	0.50	°C/W
Thermal Resistance Junction to Ambient	R_{thJA}	40	°C/W

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

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=100μA	1500	--	--	V
Gate Leakage Current	I_{GSS}	V_{GS}=18V, V_{DS}=0V	--	--	100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=1500V, V_{GS}=0V	--	1	5	μA
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_{DS}=15mA	2	2.8	4	V
		V_{DS}=V_{GS}, I_{DS}=15mA,T_j=175°C	--	1.9	--	
Drain-Source On-state Resistance	$R_{DS(on)}$	V_{GS}=18V, I_D=30A	--	40	53	mΩ
		V_{GS}=18V, I_D=30A, T_J=175°C	--	80	--	
Drain-Source On-state Resistance	$R_{DS(on)}$	V_{GS}=15V, I_D=30A	--	46	62	mΩ
		V_{GS}=15V, I_D=30A, T_J=175°C	--	96	--	
Total Gate Charge	Q_g	$V_{GS(off)}$=-4V, $V_{GS(on)}$=18V V_{DD}=1000V, I_D=30A	--	100	--	nC
Gate Source Charge	Q_{gs}		--	23.2	--	
Gate Drain Charge	Q_{gd}		--	16.8	--	
Turn-On Switching Energy	E_{ON}	V_{GS}=-4/+18V, V_{DD}=1000V · I_D=30A, R_G=5Ω, L=100uH	--	308	--	μJ
Turn-Off Switching Energy	E_{OFF}		--	111	--	
Tum-on Delay Time	$t_{d(on)}$		--	13.4	--	ns
Turn-on Rise Time	t_r		--	7.4	--	
Turn-off Delay Time	$t_{d(off)}$		--	36.4	--	
Turn-off Fall Time	t_f		--	15.6	--	
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=1200V, V_{AC}=25mV, f=1MHz	--	2696	--	pF
Output Capacitance	C_{oss}		--	85	--	
Reverse Transfer Capacitance	C_{rss}		--	7.8	--	
Gate resistance	R_G	V_{AC} = 25mV, f=1MHz	--	2.4	--	Ω

Reverse Diode Characteristics (T_J=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{SD}	I_{SD}=20A, V_{GS}=-4V	--	4.2	--	V
		I_{SD}=20A, V_{GS}=-4V, T_J=175°C	--	3.8	--	
Continuous Diode Forward Current	I_{SD}	V_{GS}=-4V	--	57	--	A
Reverse Recovery Time	t_{rr}	V_R=1000V, I_F=30A, V_{GS}=-4V, di/dt=1000A/μs	--	18.8	--	ns
Reverse Recovery Charge	Q_{rr}		--	100	--	nC
Reverse Recovery Energy	E_{REC}		--	10	--	uJ
Peak Reverse Recovery Current	I_{rrm}		--	8.6	--	A
Charge Time	t_A		--	9	--	ns
DisCharge Time	t_B		--	9.8	--	ns
Reverse Recovery Time	t_{rr}	V_R=1000V, I_F=30A, V_{GS}=-4V, di/dt=1000A/μs T_J=175°C	--	65.8	--	ns
Reverse Recovery Charge	Q_{rr}		--	740	--	nC
Reverse Recovery Energy	E_{REC}		--	25	--	μJ
Peak Reverse Recovery Current	I_{rrm}		--	17.5	--	A
Charge Time	t_A		--	23.4	--	ns
DisCharge Time	t_B		--	42.4	--	ns

Typical Characteristics Curves (T_J = 25℃ unless otherwise noted)

Figure 1. Output Characteristic (T_J=-55℃)

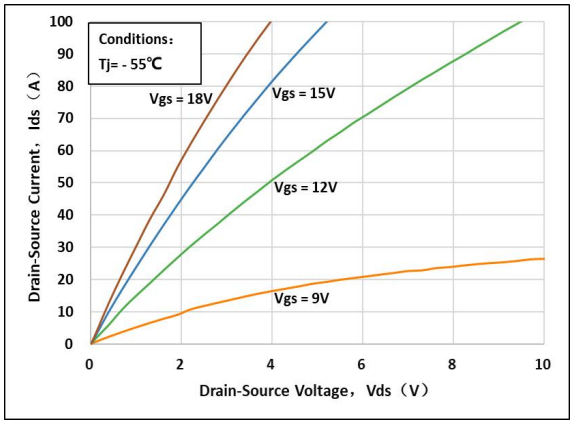


Figure 2. Output Characteristic (T_J=25℃)

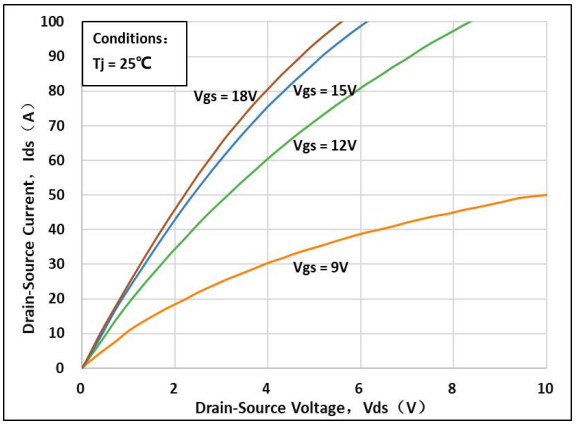


Figure 3. Output Characteristic (T_J=175℃)

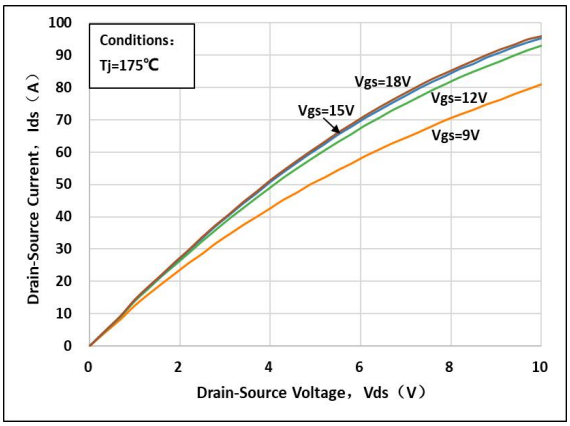


Figure 4. Rdson Vs Ids Characteristic

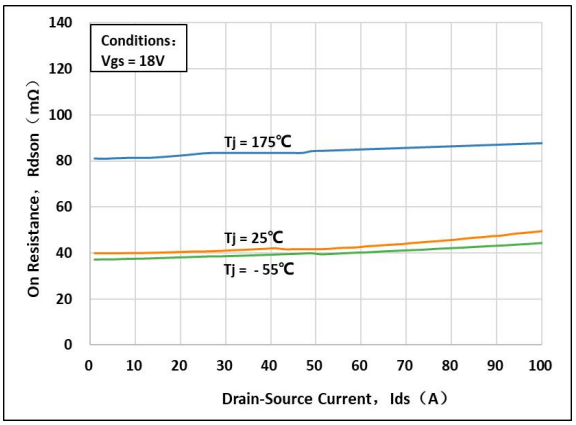


Figure 5. Rds(on) vs. Temperature

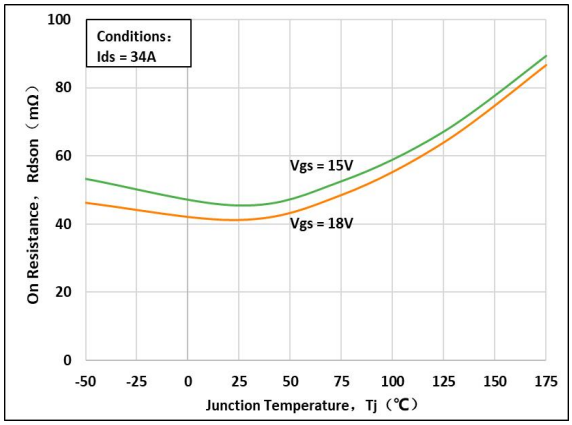
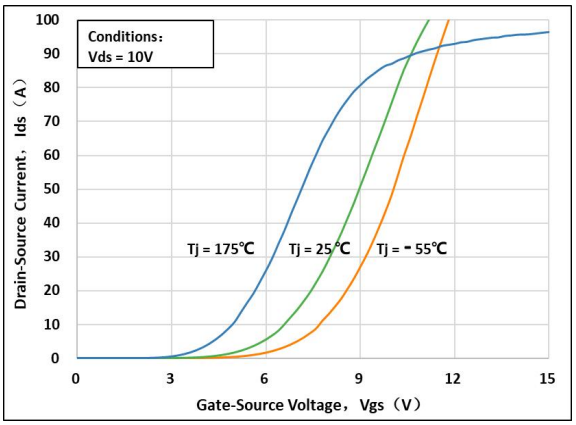


Figure 6. Transfer Characteristic



Typical Characteristics Curves (T_J = 25℃ unless otherwise noted)

Figure 7. Body-diode Characteristic (T_J=-55℃)

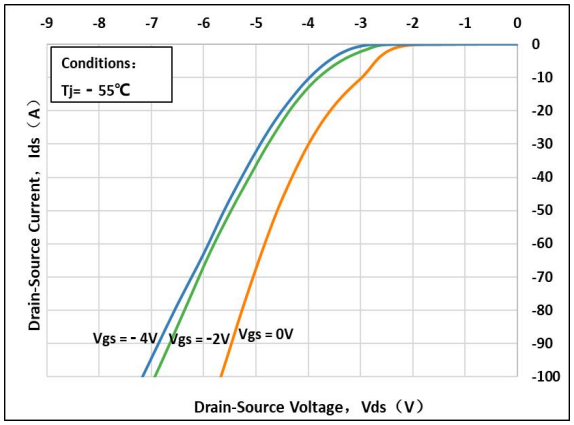


Figure 8. Body-diode Characteristic (T_J=25℃)

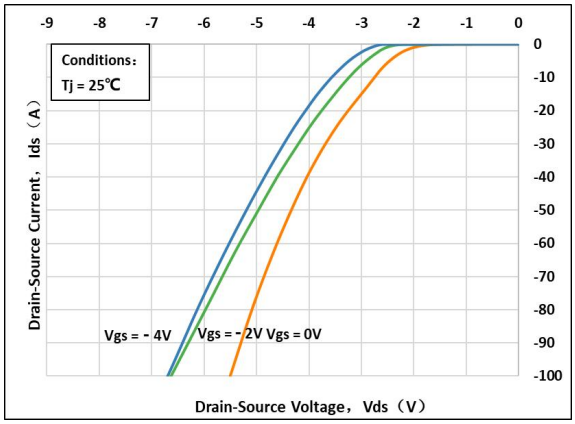


Figure 9: Body-diode Characteristic (T_J=175℃)

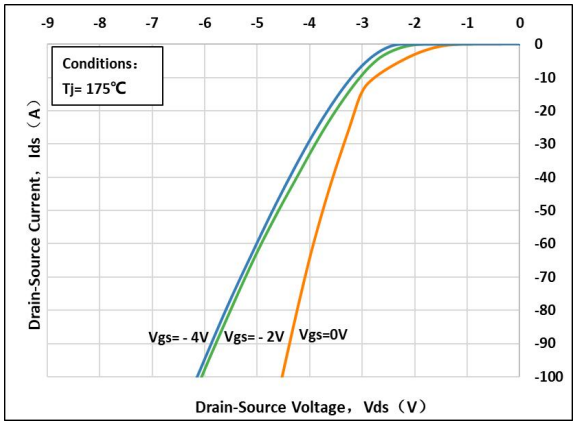


Figure 10: V_{TH} Vs T_J Temperature Characteristic

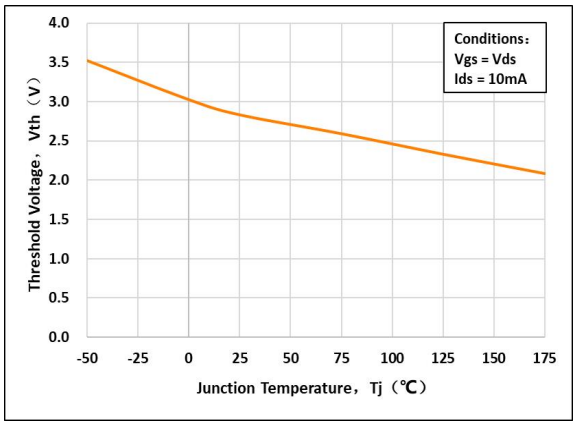


Figure 11: 3rd Quadrant Characteristic(T_J=-55℃)

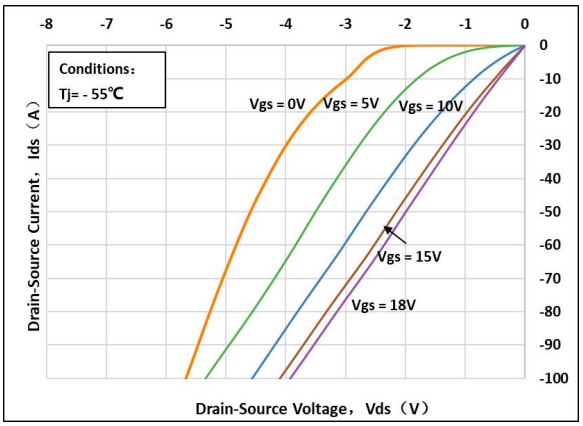
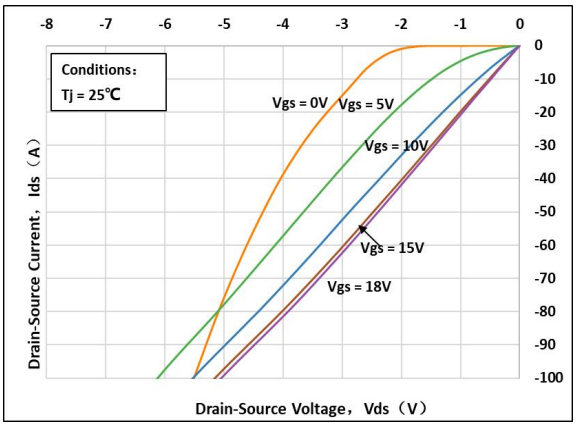


Figure 12: 3rd Quadrant Characteristic(T_J=25℃)



Typical Characteristics Curves (T_J = 25℃ unless otherwise noted)

Figure 13: 3rd Quadrant Characteristic(T_J=175℃)

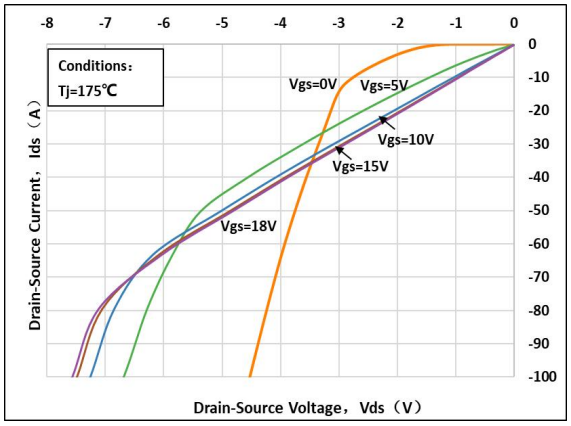


Figure 14: Gate Charge Characteristics

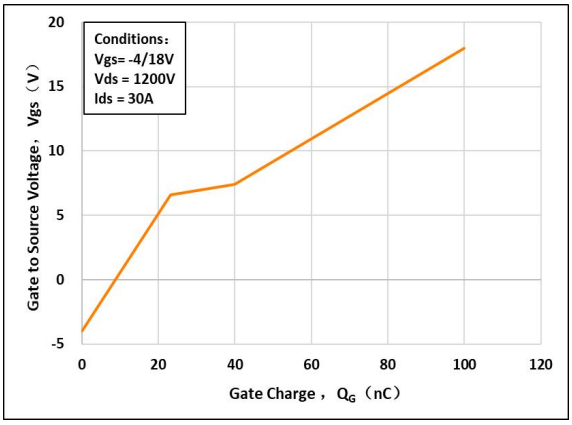


Figure 15: Drain Current vs.Case Temperature

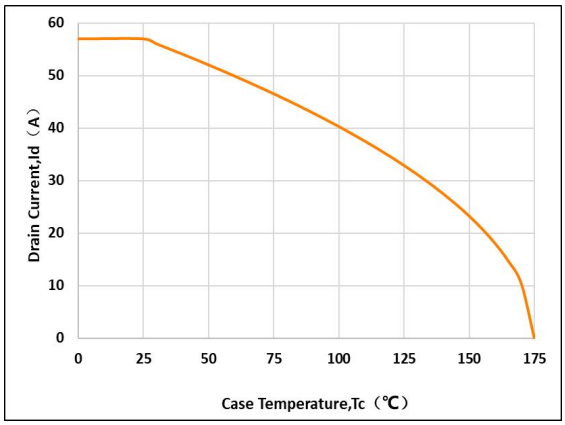


Figure 16: Safe Operating Area

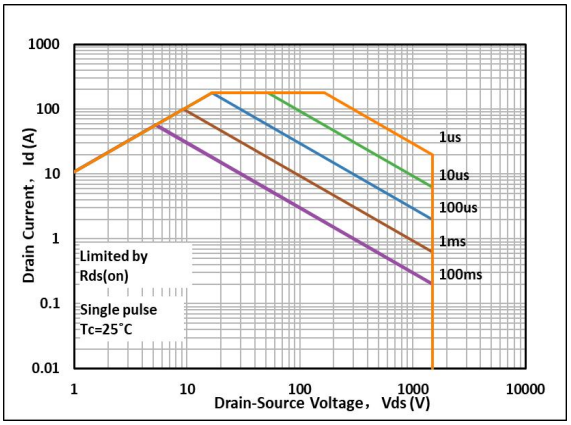


Figure 17: Capacitance Characteristics

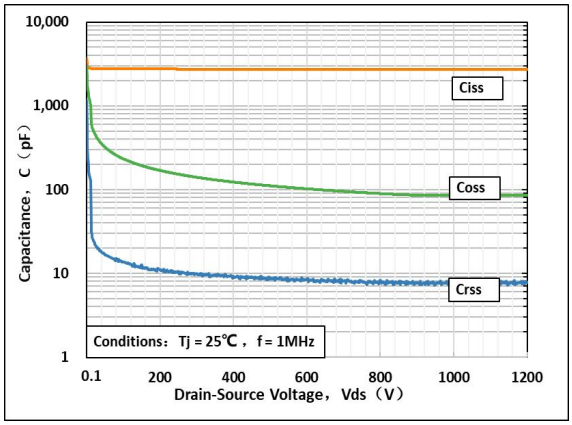
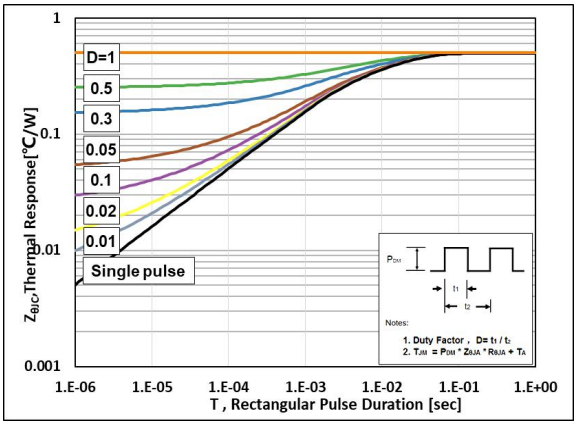
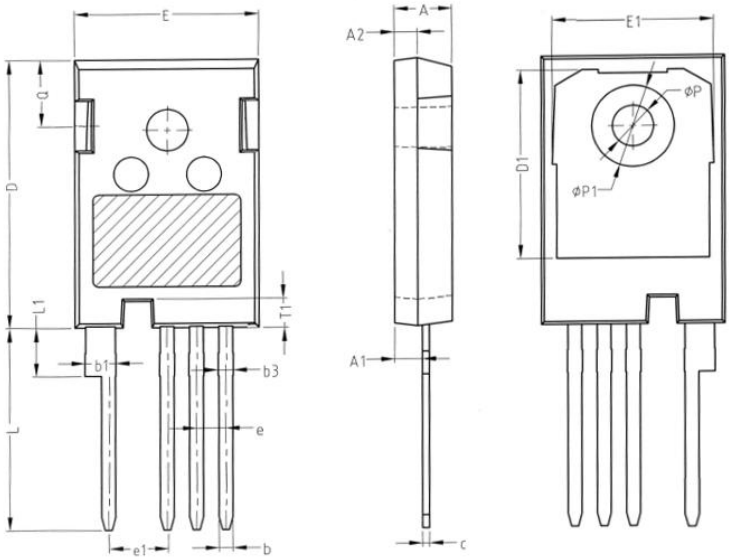


Figure 18: Transient Thermal Impedance



Package Outline Dimensions (Unit: millimeters)

TO-247-4L



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.80	2.00	2.20
b	1.06	1.21	1.36
b1	2.33	2.63	2.93
b3	1.07	1.30	1.60
c	0.51	0.61	0.75
D	23.30	23.45	23.60
D1	16.25	16.55	16.85
E	15.74	15.94	16.14
E1	13.72	14.02	14.32
T1	2.35	2.50	2.65
e	2.54 BSC		
e1	5.08 BSC		
Q	5.49	5.79	6.09
L	17.27	17.57	17.87
L1	3.99	4.19	4.39
Φp	3.40	3.60	3.80
Φp1	7.19 REF		

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