

N-Channel 650V (D-S) SiC MOSFET

Features

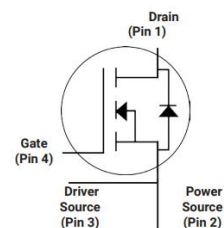
- Wide bandgap SiC MOSFET technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low reverse recovery(Qrr)
- Halogen free, RoHs compliant



TO-247-4L

Applications

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



Absolute Maximum Ratings ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Parameter		Symbol	Ratings	Unit
Drain Source Voltage		V _{DS}	650	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	49	A
	T _C =100°C		35	
Power Dissipation	T _C =25°C	P _D	241	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}	0.62	$^{\circ}\text{C/W}$
Thermal Resistance Junction to Ambient	R_{thJA}	40	$^{\circ}\text{C/W}$

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	650	--	--	V
Gate Leakage Current	I _{GSS}	V _{GS} =18V, V _{DS} =0V	--	--	100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =650V, V _{GS} =0V	--	1	10	μA
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _{DS} =4.8mA	2	2.8	4	V
		V _{DS} =V _{GS} , I _{DS} =4.8mA, T _J =175°C	--	2.1	--	
Drain-Source On-state Resistance	R _{DS(on)}	V _{GS} =18V, I _D =17.6A	--	45	59	mΩ
		V _{GS} =18V, I _D =17.6A, T _J =175°C	--	55	--	
Drain-Source On-state Resistance	R _{DS(on)}	V _{GS} =15V, I _D =17.6A	--	55	70	mΩ
		V _{GS} =15V, I _D =17.6A, T _J =175°C	--	68	--	
Total Gate Charge	Q _g	V _{GS(off)} =-4V, V _{GS(on)} =18V V _{DD} =400V, I _D =17.6A	--	69.9	--	nC
Gate Source Charge	Q _{gs}		--	15.4	--	
Gate Drain Charge	Q _{gd}		--	28	--	
Turn-On Switching Energy	E _{ON}	V _{GS} =-4/+18V, V _{DD} =400V · I _D =17.6A, R _G =5Ω, L=100uH	--	87.4	--	μJ
Turn-Off Switching Energy	E _{OFF}		--	24	--	
Turn-on Delay Time	t _{d(on)}		--	10.56	--	ns
Turn-on Rise Time	t _r		--	4.16	--	
Turn-off Delay Time	t _{d(off)}		--	19.52	--	
Turn-off Fall Time	t _f		--	6.4	--	
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =650V, V _{AC} =25mV, f=1MHz	--	1509	--	pF
Output Capacitance	C _{oss}		--	130	--	
Reverse Transfer Capacitance	C _{rss}		--	16	--	
Gate resistance	R _G	V _{AC} = 25mV, f=1MHz	--	0.9	--	Ω

Reverse Diode Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{SD}	$I_{SD}=8.8\text{A}$, $V_{GS}=-4\text{V}$	--	4.2	--	V
		$I_{SD}=8.8\text{A}$, $V_{GS}=-4\text{V}$, $T_J=175^{\circ}\text{C}$	--	3.8	--	
Continuous Diode Forward Current	I_{SD}	$V_{GS}=-4\text{V}$	--	49	--	A
Reverse Recovery Time	t_{rr}	$V_R=400\text{V}$, $I_F=17.6\text{A}$, $V_{GS}=-4\text{V}$, $di/dt=800\text{A}/\mu\text{s}$	--	20.4	--	ns
Reverse Recovery Charge	Q_{rr}		--	114.1	--	nC

Typical Characteristics Curves ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Figure 1. Output Characteristic ($T_J = -55^\circ\text{C}$)

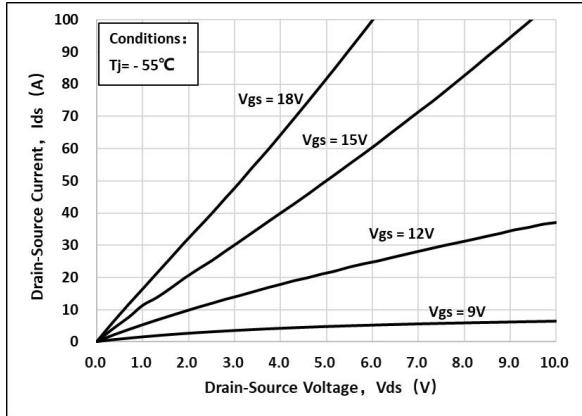


Figure 2. Output Characteristic ($T_J = 25^\circ\text{C}$)

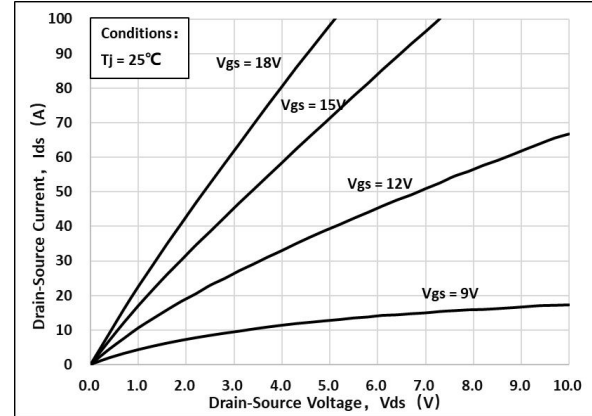


Figure 3. Output Characteristic ($T_J = 175^\circ\text{C}$)

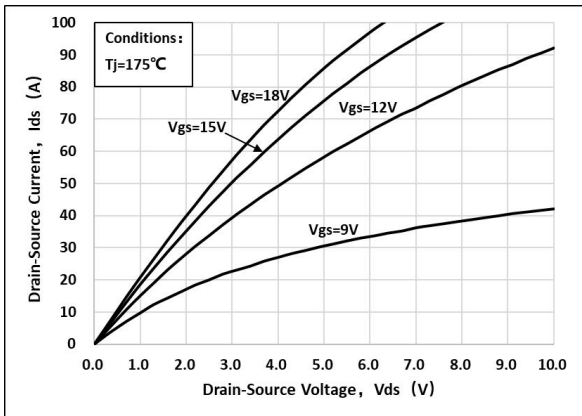


Figure 4. $R_{DS(on)}$ Vs I_{DS} Characteristic

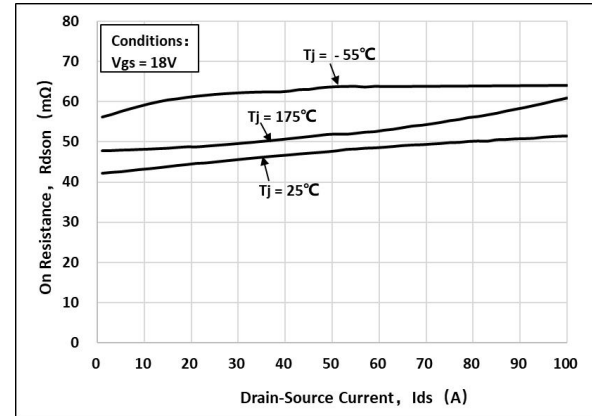


Figure 5. $R_{DS(on)}$ vs. Temperature

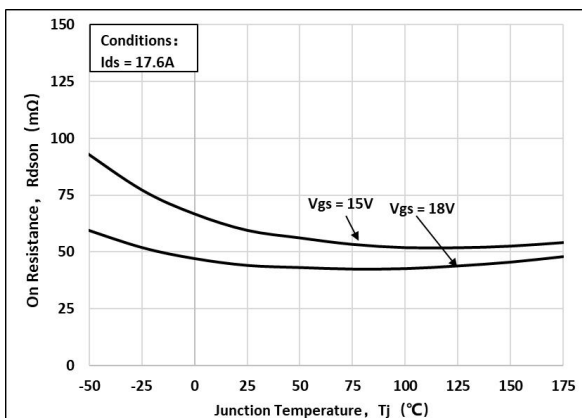
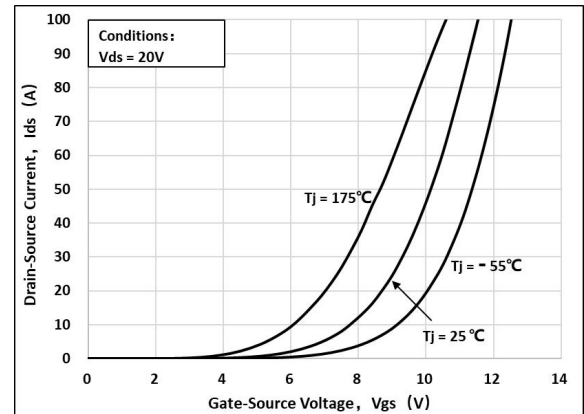


Figure 6. Transfer Characteristic



Typical Characteristics Curves ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Figure 7: Body-diode Characteristic ($T_J = -55^\circ\text{C}$)

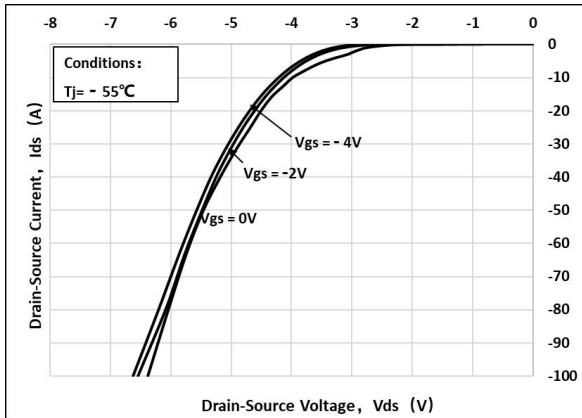


Figure 8: Body-diode Characteristic ($T_J = 25^\circ\text{C}$)

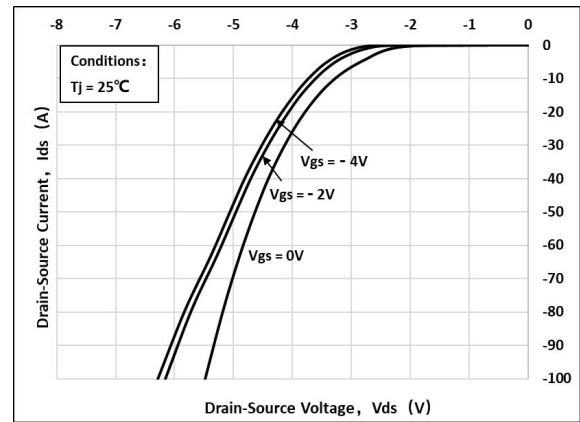


Figure 9: Body-diode Characteristic ($T_J = 175^\circ\text{C}$)

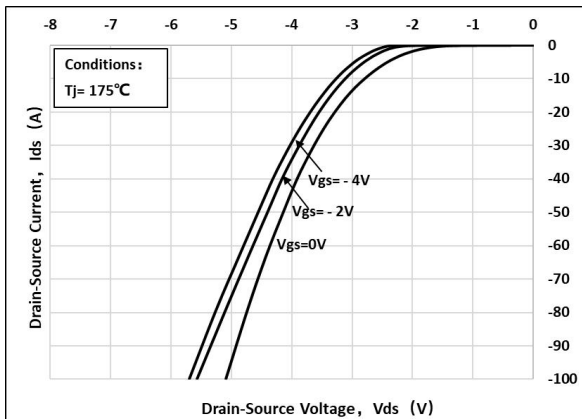


Figure 10: V_{TH} Vs T_J Temperature Characteristic

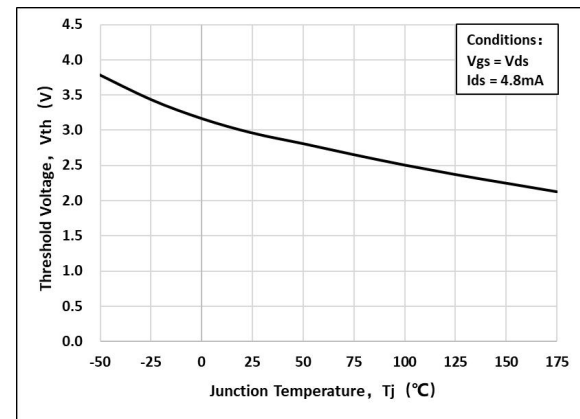


Figure 11: 3rd Quadrant Characteristic ($T_J = -55^\circ\text{C}$)

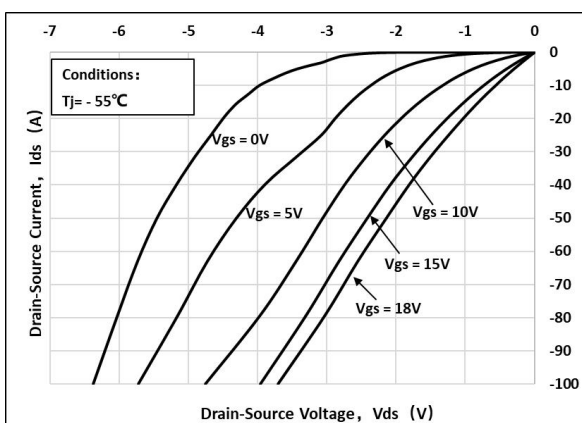
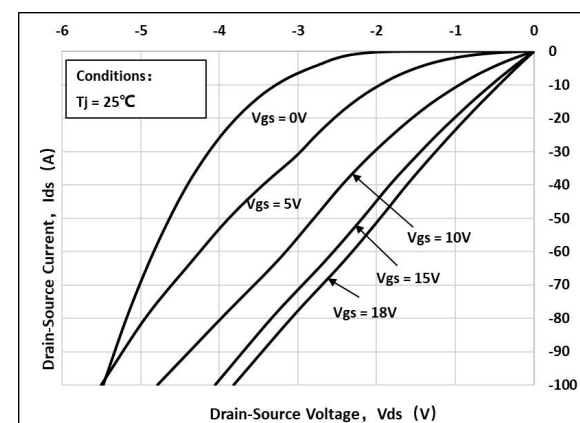


Figure 12: 3rd Quadrant Characteristic ($T_J = 25^\circ\text{C}$)



Typical Characteristics Curves ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Figure 13: 3rd Quadrant Characteristic($T_J=175^\circ\text{C}$)

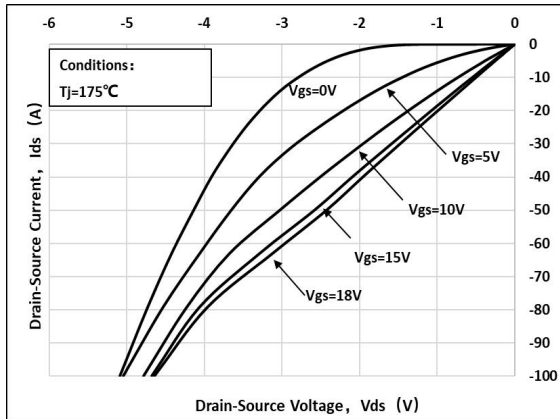


Figure 14: Gate Charge Characteristics

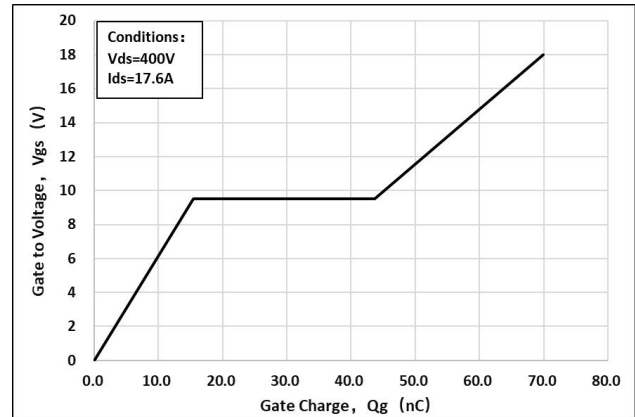


Figure 15: Capacitance Characteristic

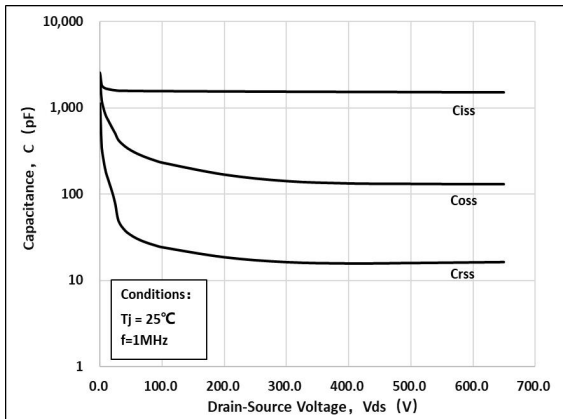


Figure 16: Safe Operating Area

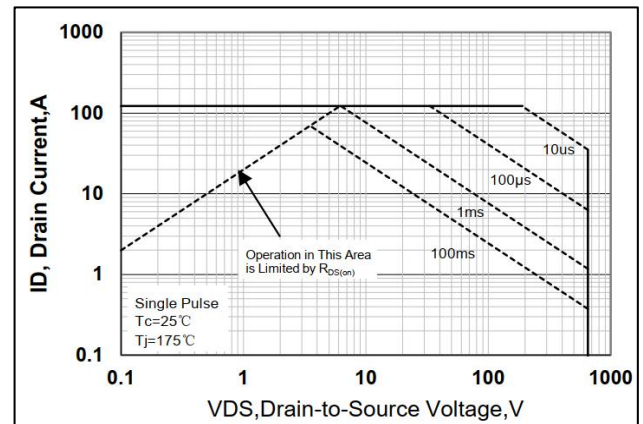
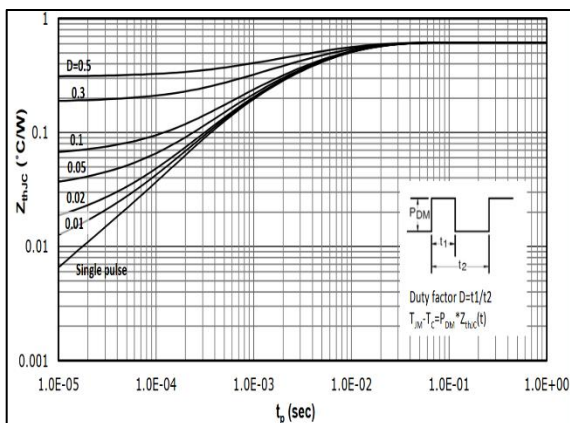
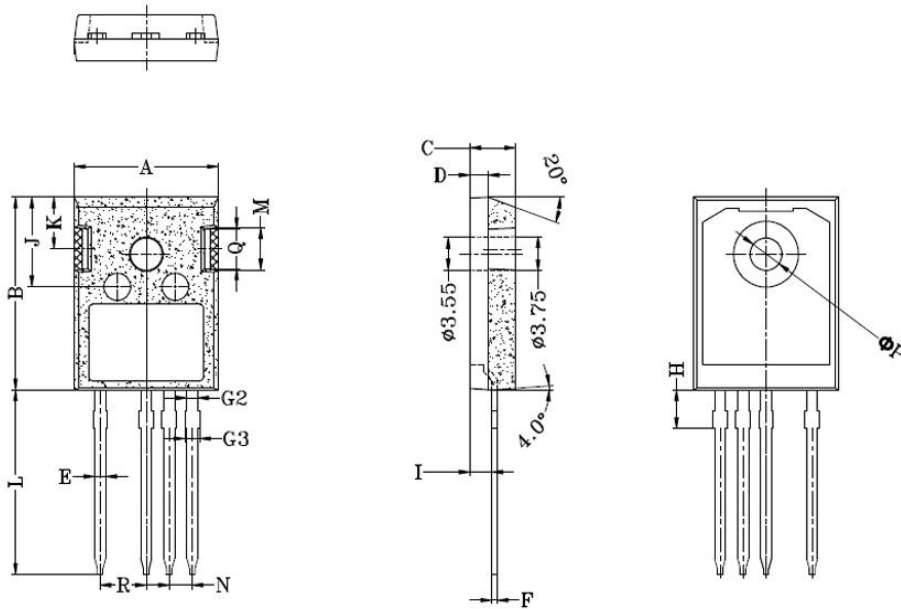


Figure 17: Transient Thermal Impedance



Package Outline Dimensions (Unit: millimeters)

TO-247-4L



项目	规范(mm)	
	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
Φ P	3.40	3.60
Q	4.232	4.432
R	4.88	5.28

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