

650V 120AN-Channel SIC Power MOSFET

Features

- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- High operating junction temperature capability
- Wide bandgap SiC MOSFET technology
- Halogen free, RoHs compliant

Mechanical Data

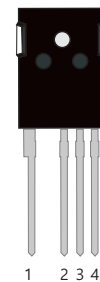
- Case:TO-247-4L Package

Application

- Motor drivers
- Renewable energy
- Automotive DC/DC converters
- Switch mode power supplies

Product Summary			
V _{DS}	R _{DS(on)} (mΩ)Typ	I _D (A)	Q _g (Typ)
650V	20@ 18V 60A	120	125nc

TO-247-4L



Block Diagram

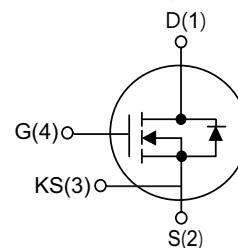


Table1 Absolute Maximum Ratings (T_c=25°C, unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DS}	650	V
Gate-Source Voltage(Max)	V _{GS(max)}	-10/+22	V
Recommend Gate-Source Voltage	V _{GSop}	0/+18	V
Continuous Drain Current	I _D	T _C =25°C	120
		T _C =100°C	100
Pulsed Drain Current (Note 1)	I _{DM}	240	A
Power Dissipation T _C =25°C	P _D	333	W
Operating Junction and Storage Temperature	T _J /T _{STG}	-55 ~ +175	°C

Table 2.Thermal Characteristics

Parameter	Symbol	KWSC20N65P4	Unit
Thermal resistance Junction to Case	R _{θJC}	0.45	°C/W
Thermal resistance Junction to Ambient	R _{θJA}	40	°C/W

Table 3. Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V,I _D =100μA	650	-	-	V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =650V,V _{GS} =0V	-	-	10	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =22V,V _{DS} =0V	-	10	250	nA
	Reverse		V _{GS} =-8V,V _{DS} =0V	-	-10	-250	nA
On Characteristics							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} ,I _D =23mA	2.7	2.6	4.5	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =18V,I _D =60A,T _J =25°C	-	20	26	mΩ
			V _{GS} =18V,I _D =60A,T _J =175°C	-	23	-	
Gate Resisitance		R _G	f=1MHz	-	1.3	-	Ω
Dynamic Characteristics							
Input Capacitance		C _{ISS}	V _{DS} =500V,V _{GS} =0V, f=100KHz,V _{AC} =25mV	-	3200	-	pF
Output Capacitance		C _{OSS}		-	230	-	pF
Reverse Transfer Capacitance		C _{RSS}		-	20	-	pF
Total Gate Charge		Q _G	V _{DD} =500V,I _D =60A, V _{GS} =0/18V	-	125	-	nC
Gate-Source Charge		Q _{GS}		-	35	-	nC
Gate-Drain Charge		Q _{GD}		-	17	-	nC
Drain-Source Diode Characteristics and Maximum Ratings(Note 2)							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V,I _S =30A	-	3.4	-	V
Continuous Diode Forward Current		I _S		-	120	-	A
Reverse Recovery Time		trr	V _{GS} =0V, V _R =500V, I _{SD} =60A	-	35	-	ns
Recovered charge		Q _{rr}		-	13	-	nC
Peak reverse recovery current		I _{rrm}		-	6	-	A

Notes: 1 Repetitive Rating Pulse width limited by maximum junction temperature

2 Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

Typical Characteristics Diagrams

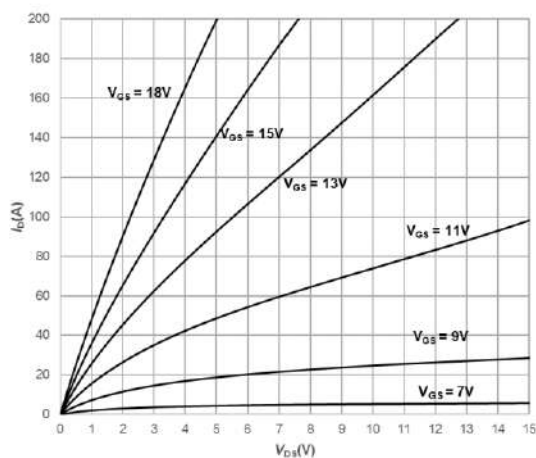


Fig1. Output Characteristics $T_j=25^\circ\text{C}$

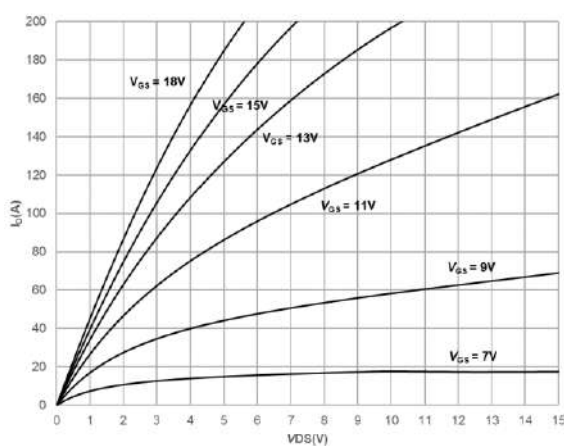


Fig2. Output Characteristics $T_j=175^\circ\text{C}$

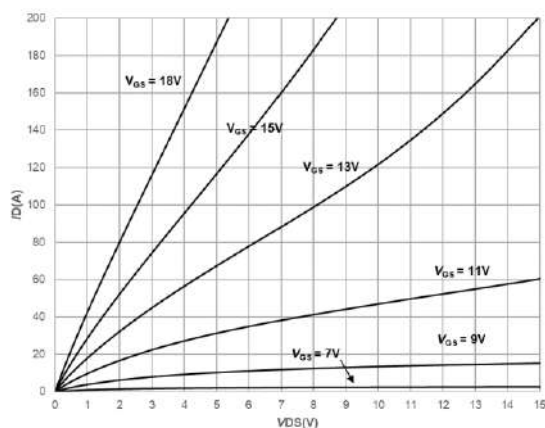


Fig3. Output Characteristics $T_j=-40^\circ\text{C}$

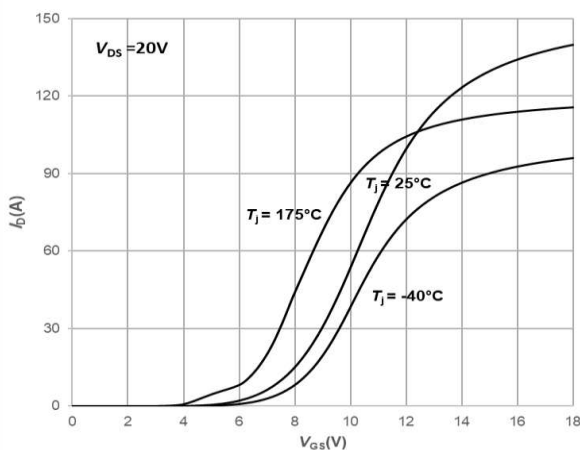


Fig4. Typical Transfer Characteristics

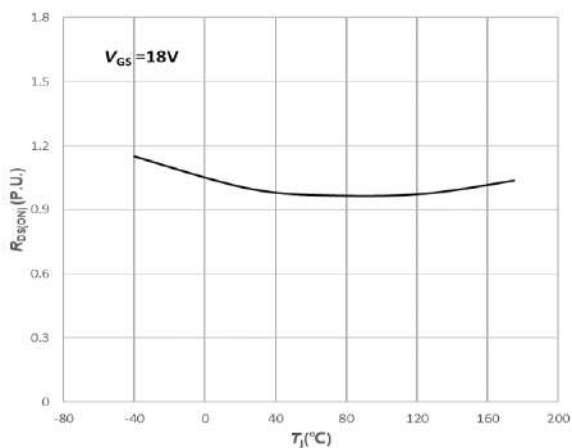


Fig5. Normalized On-Resistance vs. Temperature

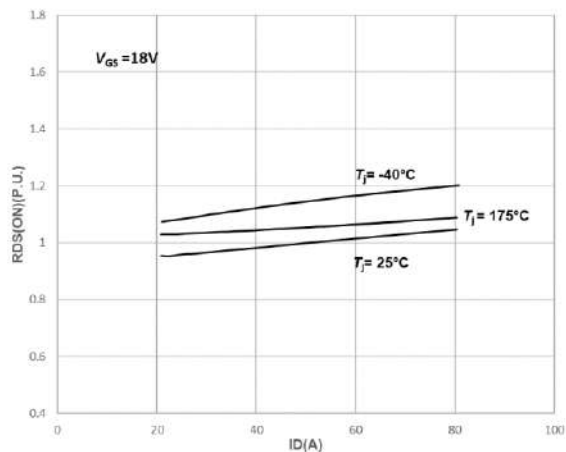


Fig6. Normalized On-Resistance vs. Drain Current For Various Temperatures

Typical Characteristics Diagrams

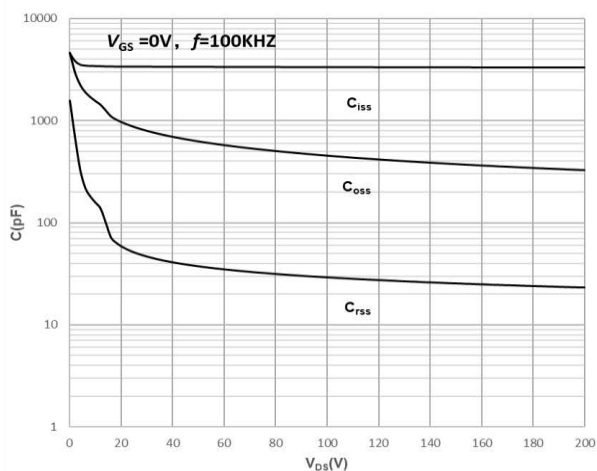


Fig7. Capacitances vs. Drain-Source Voltage (0-200V)

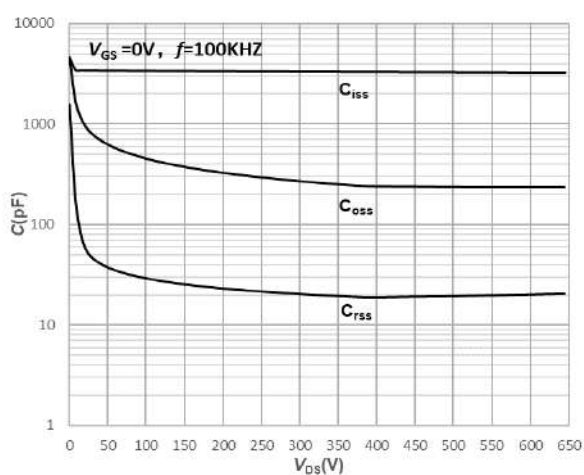


Fig8. Capacitances vs. Drain-Source Voltage (0-650V)

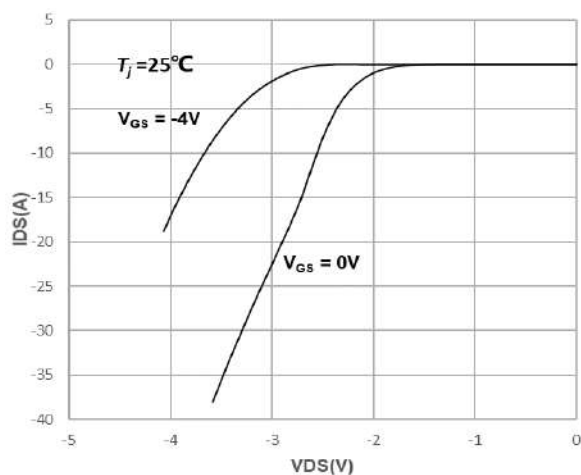


Fig9. Body Diode Characteristics

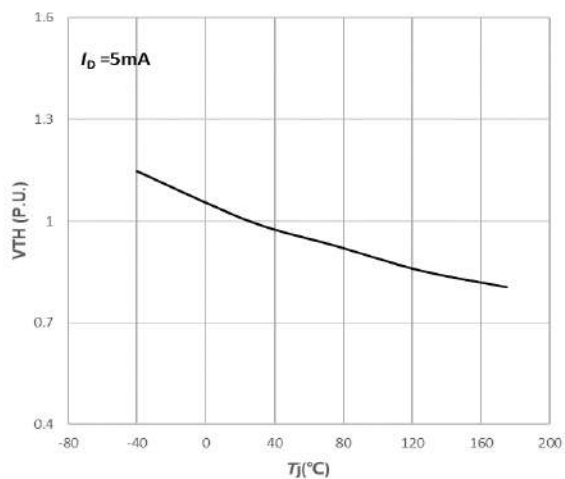
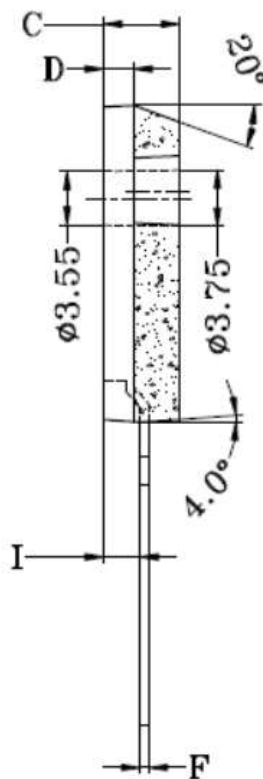
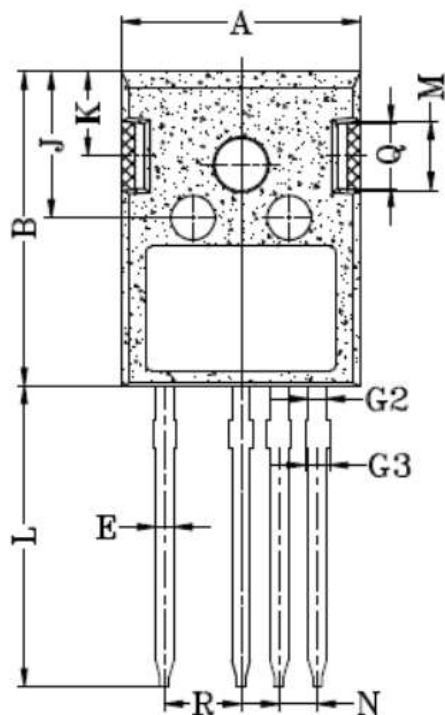


Fig10. Normalized Threshold Voltage vs. Temperature

Dimensions

TO-247-4L package



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
Φ P	3.40	3.60
Q	4.232	4.432
R	4.88	5.28

