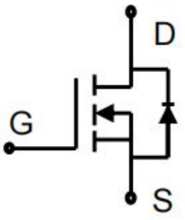
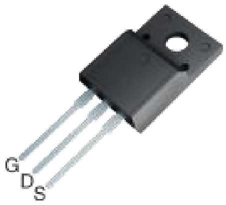
SiC MOSFET N-channel 650V/20A

Parameter	Value	Unit
V_{DS}	650	V
$R_{DS(on)}$	180	mΩ
$V_{GS(TH)}$	2.7 ~ 4.5	V
I_D (at TC=25℃)	20	A





TO-220F

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
- Robust against Parasitic Turn on Even 0V Turn off Gate Voltage

APPLICATIONS

- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives
- Pulsed Power Applications

MAXIMUM RATED VALUES (at TJ = 25 °C, unless otherwise specified)

Parameter	Symbol	Test Condition	Value	Unit
Drain to Source Voltage	VDS	VGS = 0V, ID = 100μA	650	V
Gate to Source Voltage	VGS	Absolute maximum values	-10/+22	V
Recommended Operation Voltage of Gate to Source	VGSop	Recommended operational values	0/+18	V
Continuous Drain Current	ID	VGS=15V，TC=25℃	20	A
		VGS=15V，TC=100℃	18	
Pulsed Drain Current	IDM	VGS=15V，TC=25℃	40	A
Power Dissipation	Ptot	TC=25℃, Tj=175℃	33	W
Operating and Storage Temperature	Tj, Tstg		-55 to +175	℃

THERMAL CHARACTERISTICS

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Thermal Resistance from Junction to Case	Rth(j-c)	-	4.5	-	℃/W

ELECTRICAL CHARACTERISTICS (at TJ = 25°C unless otherwise specified)

Static Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Drain to Source Breakdown Voltage	V(BR)DSS	VGS=0V, ID=500μA	650			V
Gate Threshold Voltage	VGS(th)	VGS=VDS, ID=3.5mA	2.7		4.5	V
Zero Gate Voltage Drain Current	IDSS	VGS=0V, VDS=650V, Tj=25℃			10	μA
Gate to Source Leakage Current	IGSS	VGS=18V, VDS=0V			250	nA
Drain to Source on Resistance	RDS(on)	VGS=15V, ID=8.5A		180	240	mΩ
		VGS=15V, ID=8.5A,Tj=175℃		160		
		VGS=18V, ID=8.5A		120		
		VGS=18V, ID=8.5A,Tj=175℃		130		

Dynamic Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Input Capacitance	Ciss	VGS=0V, VDS=500V, f=1MHz, Tj=25℃		491		pF
Output Capacitance	Coss			39		
Reverse Transfer Capacitance	Crss			4.2		
Total Gate Charge	Qg	VGS=0/15V, VDS=500V, ID=8.5A, Tj=25℃		28.6		nC
Gate-Source Charge	Qgs			8.3		
Gate-Drain Charge	Qgd			13.8		
Gate Resistance	Rg	VAC=25mV, f=1MHz		6.5		Ω

Switching Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Turn-On Delay Time	td(on)	VGS=0/15V，VDD=500V, ID=8.5A, Rg=10Ω		16		ns
Rise Time	tr			55		
Turn-Off Delay Time	td(off)			34		
Fall Time	tf			71		

Reverse Diode Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	VSD	VGS=0V, ISD=5A, Tj=25℃		3.4		V
Continuous Diode Forward Current	IS	VGS=0V, Tj=25℃		20		A
Reverse Recovery Time	trr	VGS = 0V, ISD=8.5A, VR=500V, di/dt=530A/us, Tj=25℃		17.6		ns
Reverse Recovery Charge	Qrr			43		nC
Peak Reverse Recovery Current	Irrm			4.2		A

CHARACTERISTICS DIAGRAMS

Fig1. Output Characteristics Tj=25℃

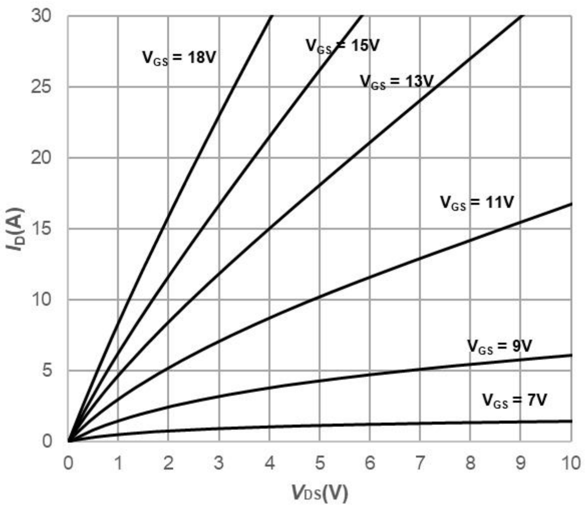


Fig2. Output Characteristics Tj=175℃

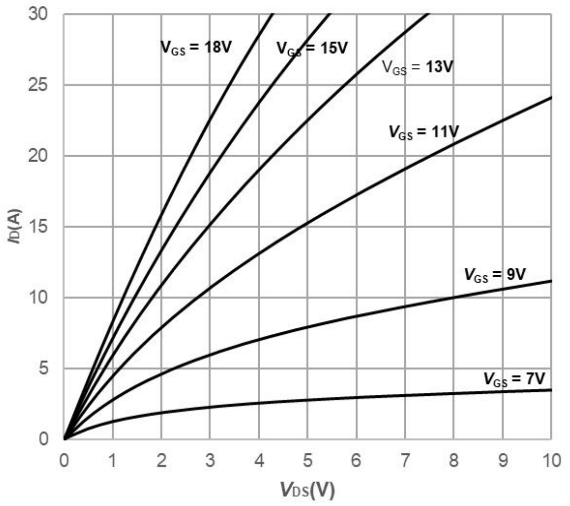


Fig3. Typical Transfer Characteristics

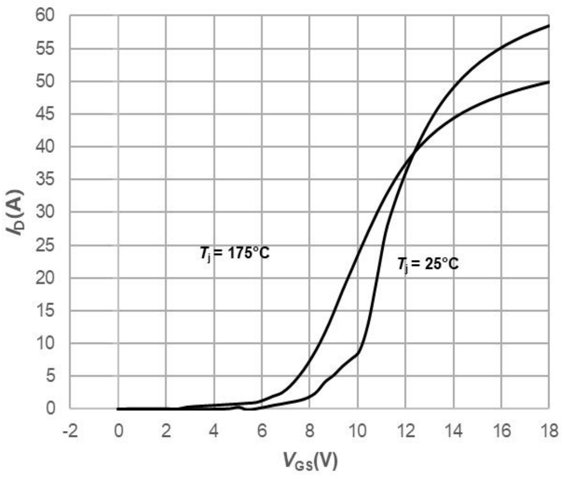


Fig4. Normalized On-Resistance vs. Temperature

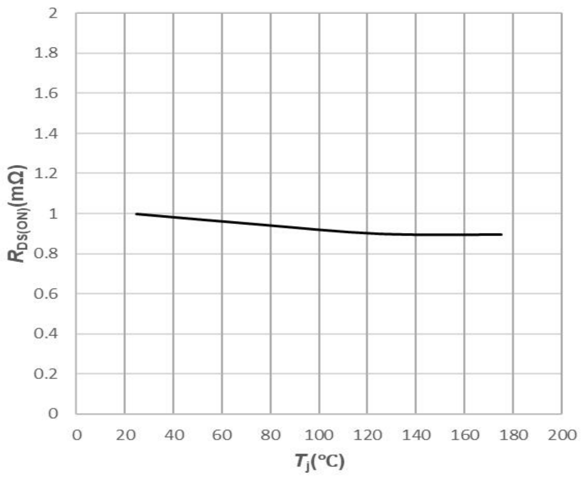


Fig5. Normalized On-Resistance vs. Drain Current For Various Temperatures

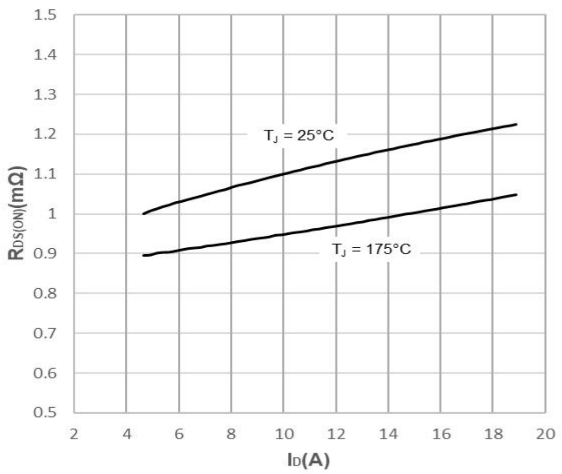


Fig6. Normalized Threshold Voltage vs. Temperature

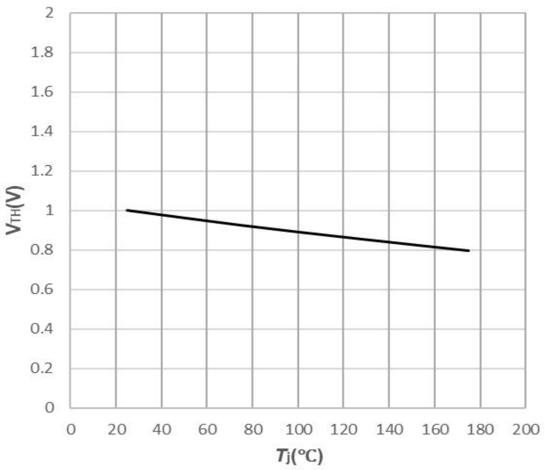


Fig7. Capacitances vs. Drain-Source Voltage (0-200V)

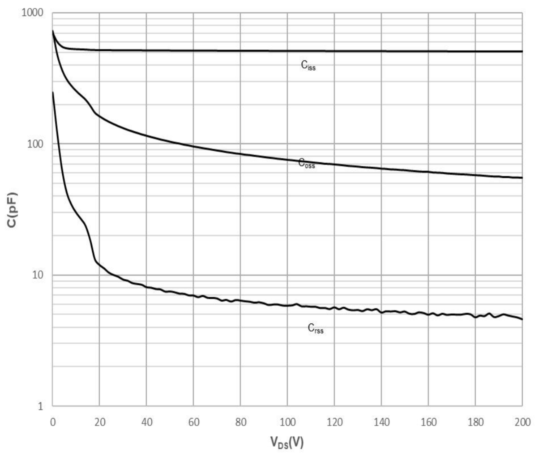


Fig8. Capacitances vs. Drain-Source Voltage (0-600V)

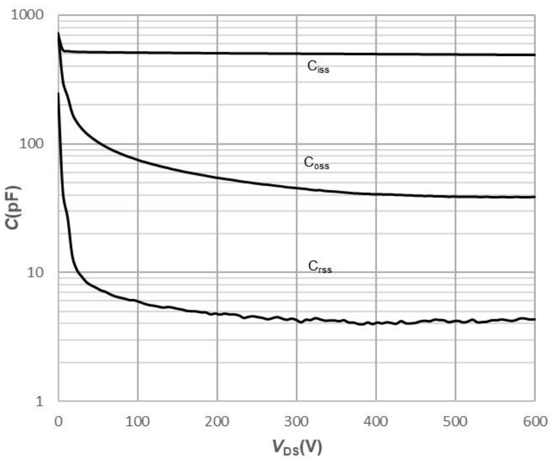
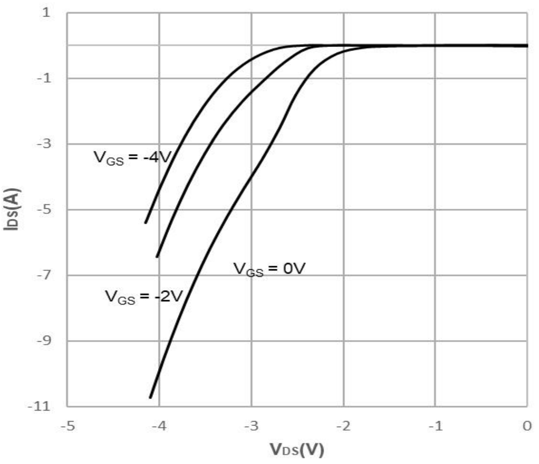
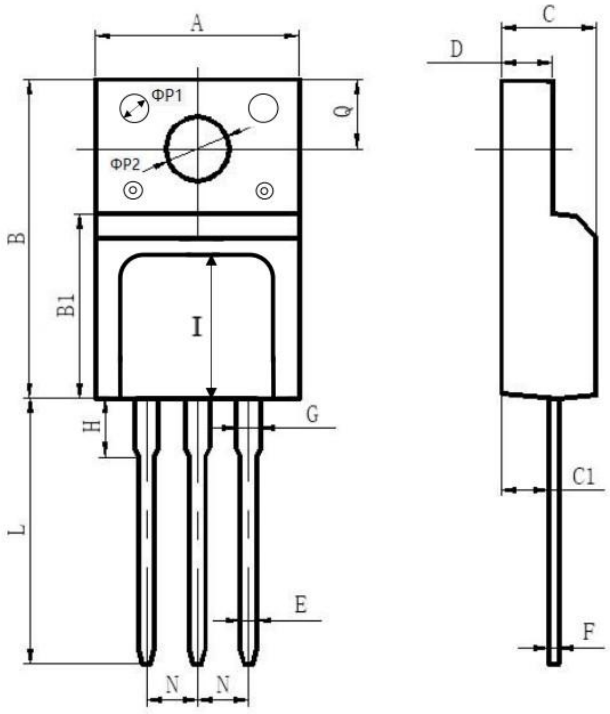


Fig9. Body Diode Characteristics



PACKAGE OUTLINE



Ref.	Dimensions(mm)	
	MIN	MAX
A	9.70	10.30
B	15.50	16.10
B1	8.99	9.39
C	4.40	4.80
C1	2.15	2.55
D	2.44	2.64
E	0.70	0.90
F	0.40	0.60
G	1.12	1.42
H	3.40	3.80
I	7.40	7.60
L	12.6	13.6
N	2.34	2.74
Q	3.15	3.55
ΦP1	1.40	1.60
ΦP2	3.00	3.30

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