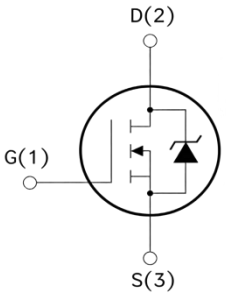
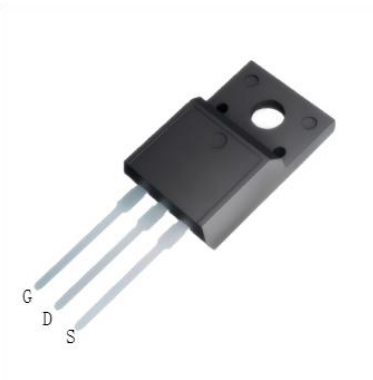
Silicon Carbide Power MOSFET

Parameter	Value	Unit
V_{DS}	650	V
I_D	11	A
$R_{DS(ON)}$	380	mΩ
Q_G	21.3	nC





TO-220F

Features

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low $R_{DS(on)}$
- Low impedance package with driver source pin
- Easy to parallel and simple to drive

Applications

- Motor Drives
- Battery Chargers
- Photovoltaic-storage-charging
- High Voltage DC/DC Converters
- Switched-Mode Power Supply(SMPS)

Absolute Maximum Ratings (at T_J=25℃ unless otherwise specified)

Parameter	Symbol	Conditions	Value	Unit
Drain-source Voltage	V_{DS}	V_{GS}=0V	650	V
Gate-source Voltage	V_{GS}	Absolute maximum values	-10/+22	V
	V_{GSop}	Recommended operational values	0/+18	
Drain Current (continuous)	I_D	V_{GS}=15V; T_C=25°C	11	A
		V_{GS}=15V; T_C=175°C	9	
Drain Current (pulsed)	I_{DM}	V_{GS}=15V; T_C=25°C	22	A
Power Dissipation	P_D	T_C=25°C; T_J=175°C	24	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-	-55 to +175	°C
Thermal Resistance from Junction to Case	$R_{\theta JC}$	-	6.25	°C/W

Electrical Characteristics

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Static characteristics (at T_C=25°C unless otherwise specified)						
Drain-Source Breakdown Voltage	B_{VDS}	V_{GS}=0V; I_D=500uA	650	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}; I_{DS}=1.8mA	2.7	-	4.5	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=650V; V_{GS}=0V; T_J=25°C	-	-	10	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=18V; V_{DS}=0V	-	-	250	nA
Static Drain-Source on Resistance	$R_{DS(on)}$	V_{GS}=15V; I_D=5A	-	380	500	mΩ
		V_{GS}=15V; I_D=5A; T_J=175°C	-	325	-	
		V_{GS}=18V; I_D=5A	-	260	-	
		V_{GS}=18V; I_D=5A; T_J=175°C	-	270	-	
Dynamic characteristics (at T_C=25°C unless otherwise specified)						
Input Capacitance	C_{iss}	V_{DS}=500V; f=100KHz; V_{GS}=0V; T_J=25°C	-	254	-	pF
Output Capacitance	C_{oss}		-	20.2	-	
Reverse Transfer Capacitance	C_{rss}		-	2.4	-	
Total Gate Charge	Q_G	V_{DS}=500V; V_{GS}=0/+15V; I_D=5A; T_J=25°C	-	21.3	-	nC
Gate-Source Charge	Q_{GS}		-	6.7	-	
Gate-Drain Charge	Q_{GD}		-	11.5	-	
Gate Resistor	R_G	f=1MHz; V_{AC}=25mV	-	14.3	-	Ω
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=500V; V_{GS}=0/+15V; I_D=5A; $R_{g(ext)}$=10Ω	-	24	-	ns
Rise Time	t_r		-	42	-	
Turn-off Delay Time	$t_{d(off)}$		-	26.8	-	
Fall Time	t_f		-	76	-	

Reverse SiC Diode Characteristics(at T_J=25℃ unless otherwise specified)

Parameter	Symbol	Conditions	Values			Units
			Min.	Typ.	Max.	
Diode Forward Voltage	V_{FSD}	V_{GS}=0V; I_F=3A; T_J=25°C	-	3.5	-	V
Continuous Diode Forward Current	I_S	V_{GS}=0V; T_J=25°C	-	11	-	A
Reverse Recovery Time	t_{RR}	V_R=500V; V_{GS}=0V; I_F=5A; di/dt=530A/μs; T_J=25°C	-	17.8	-	ns
Reverse Recovery Charge	Q_{RR}		-	33.7	-	nC
Peak Reverse Recovery Current	I_{RRM}		-	3.5	-	A

Typical Characteristics

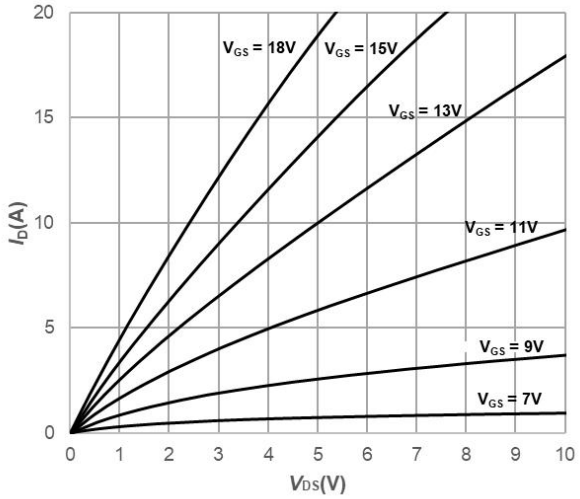


Fig1. Output Characteristics Tj=25℃

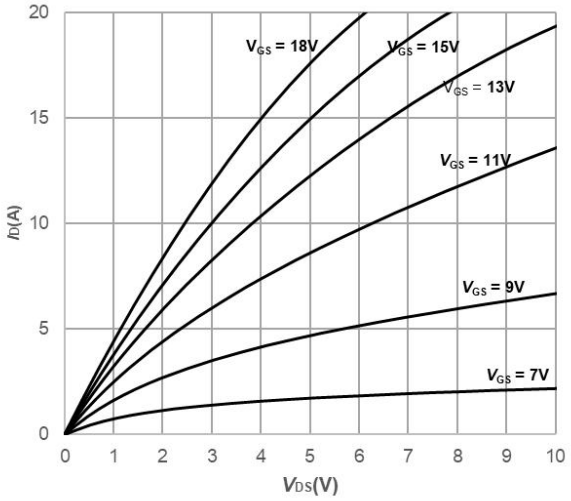


Fig2. Output Characteristics *T*j=175℃

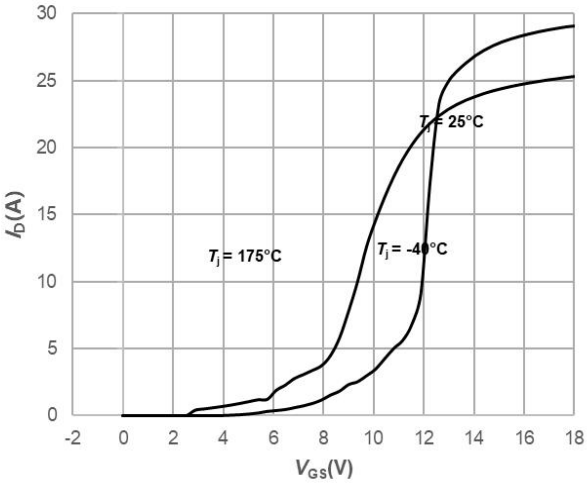


Fig3. Typical Transfer Characteristics VDS=20V

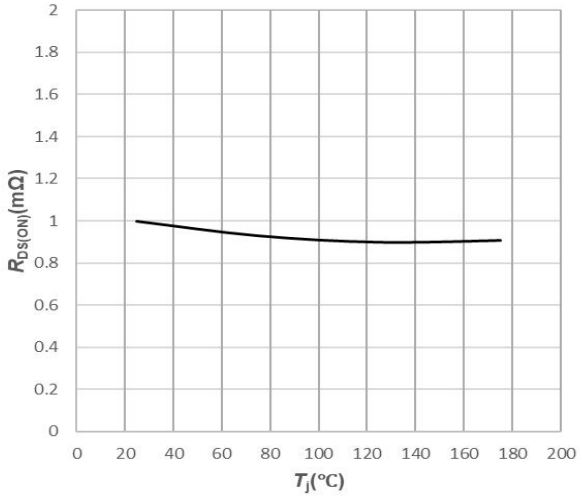


Fig4. Normalized On-Resistance vs. Temperature VGS=15V

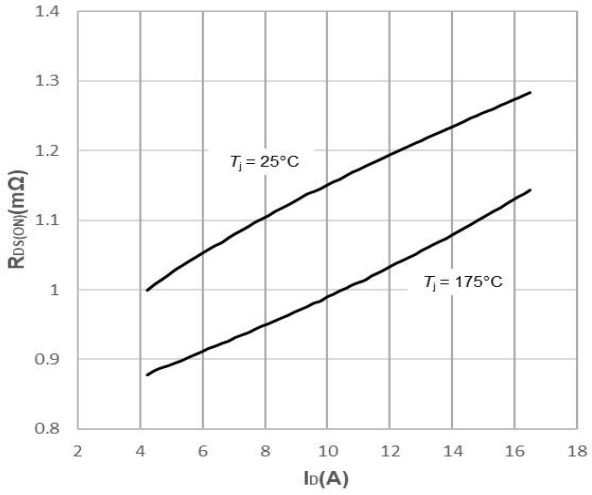


Fig5. Normalized On-Resistance vs. Drain Current For Various Temperatures VGS=15V

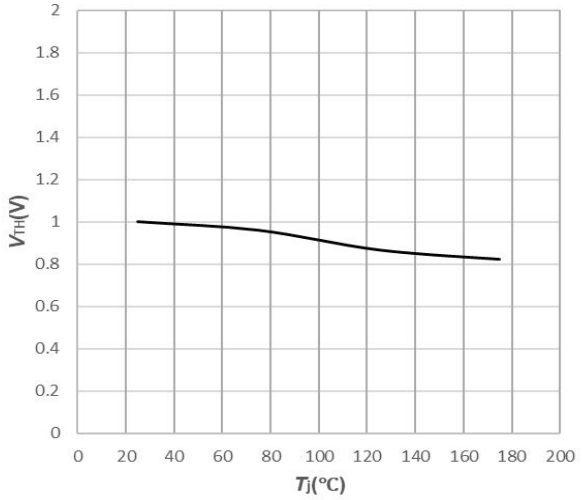


Fig6. Normalized Threshold Voltage vs. Temperature ID=5mA

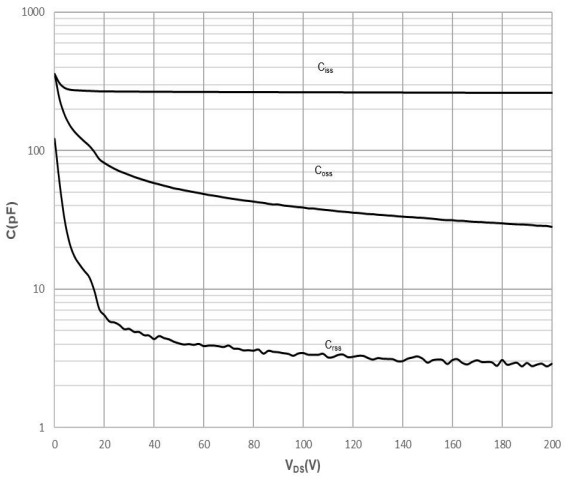


Fig7. Capacitances vs. Drain-Source Voltage (0-200V)
VGS=0V, f=1MHz

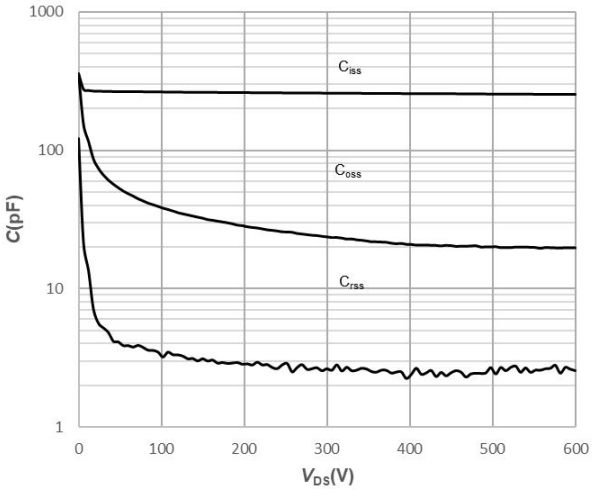


Fig8. Capacitances vs. Drain-Source Voltage (0-600V)
VGS=0V, f=1MHz

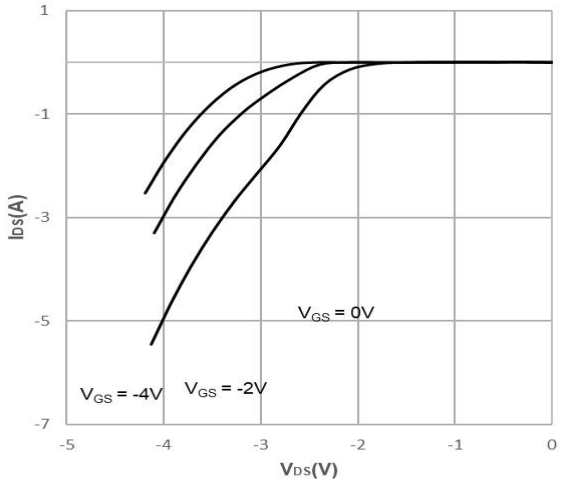
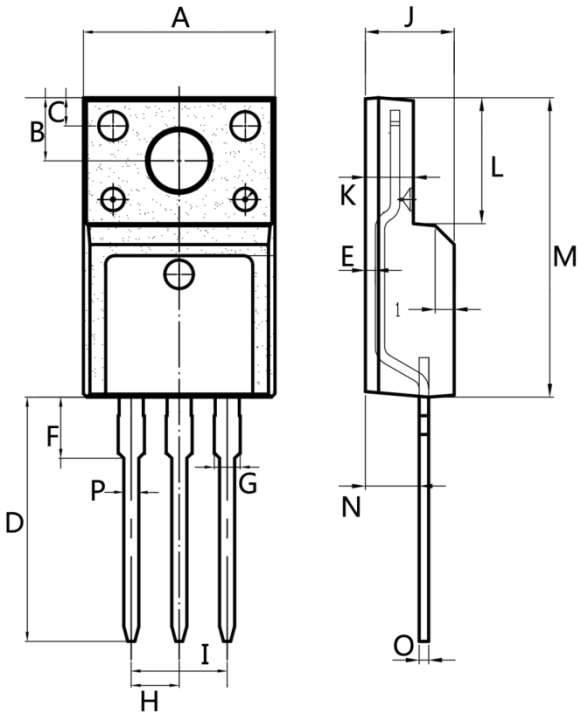


Fig9. Body Diode Characteristics Tj=25℃

Package Outlines(Unit:mm)

TO-220F



Dim.	Min.	Max.
A	9.95	10.35
B	2.95	3.25
C	1.25	1.45
D	12.8	13.2
E	0.4	0.6
F	2.8	3.5
G	1.3	1.45
H	Typ 2.54	
I	Typ 5.08	
J	4.5	5
K	2.45	2.65
L	6.5	6.8
M	15.4	16
N	2.75	3.05
O	0.45	0.55
P	0.7	0.9
All Dimensions in millimeter		

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