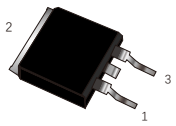
650V 20A N-Channel SIC Power MOSFE

Features

- High blocking voltage with low on-resistance High
- speed switching with low capacitance Wide Bandgap
- SiC MOSFET Technology Halogen free, RoHs
- compliant

TO-252
(DPAK)



Mechanical Data

- Case:TO-252 Package

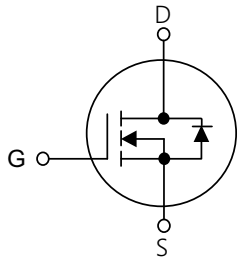
Application

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

Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram



Product Summary			
V_{DS}	$R_{DS(on)}$(mΩ)Typ	I_D(A)	Qg(Typ)
650V	180@ 15V 8.5A	20	28nc

Marking:SC180N65M / JF SC180N65M

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	T_C=25°C	I_D	20	A
	T_C=100°C		18	
Pulsed Drain Current (Note 1)		I_{DM}	40	A
Power Dissipation	T_C=25°C	P_D	52	W
Operating Junction and Storage Temperature		T_J/T_{STG}	-55 ~ +175	°C

Table 2.Thermal Characteristics

Parameter	Symbol	SC180N65M	Unit
Thermal resistance Junction to Case	$R_{\theta JC}$	2.88	°C/W

Table 3. Electrical Characteristics (T =25°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=500μA	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}=18V,V_{DS}=0V	-	10	250	nA
	Reverse		V_{GS}=-4V,V_{DS}=0V	-	-10	-250	nA
On Characteristics							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS},I_D=3.5mA	2.7	-	4.5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=15V,I_D=8.5A,T_J=25°C	-	180	240	mΩ
			V_{GS}=15V,I_D=8.5A,T_J=175°C	-	160	-	
			V_{GS}=18V,I_D=8.5A,T_J=25°C	-	120	-	
			V_{GS}=18V,I_D=8.5A,T_J=175°C	-	130	-	
Gate Resisitance		R_G	f=1MHz	-	6.5	-	Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=500V,V_{GS}=0V , f=1MHz	-	491	-	pF
Output Capacitance		C_{OSS}		-	39	-	pF
Reverse Transfer Capacitance		C_{RSS}		-	4.2	-	pF
Turn-On Delay Time		td(on)	V_{DS}=500V,I_D=8.5A V_{GS}=0/15V,R_G=10Ω, T_J=25°C	-	16	-	ns
Turn-On Rise Time		t_R		-	55	-	ns
Turn-Off Delay Time		td(off)		-	34	-	ns
Turn-Off Fall Time		tf		-	71	-	ns
Total Gate Charge		Q_G	V_{DD}=500V,I_D=8.5A , V_{GS}=0/15V	-	28	-	nC
Gate-Source Charge		Q_{GS}		-	8.3	-	nC
Gate-Drain Charge		Q_{GD}		-	13.8	-	nC
Drain-Source Diode Characteristics and Maximum Ratings(Note 2)							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V,I_S=5A	-	3.4	-	V
Continuous Diode Forward Current		I_S		-	20	-	A
Reverse Recovery Time		trr	V_R=500V,V_{GS}=0V I_{SD}=8.5A, di/dt=530A/us	-	17.6	-	ns
Recovered charge		Qrr		-	43	-	nC
Peak reverse recovery current		Irrm		-	4.2	-	A

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

2 Pulse Test: Pulse width ≤300μS,Duty cycle≤2%

Typical Characteristics Diagrams

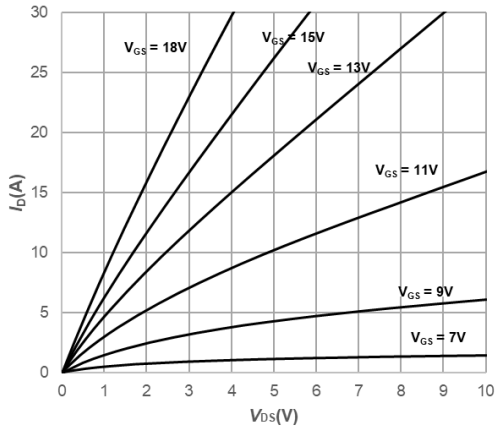


Fig1. Output Characteristics T_j=25℃

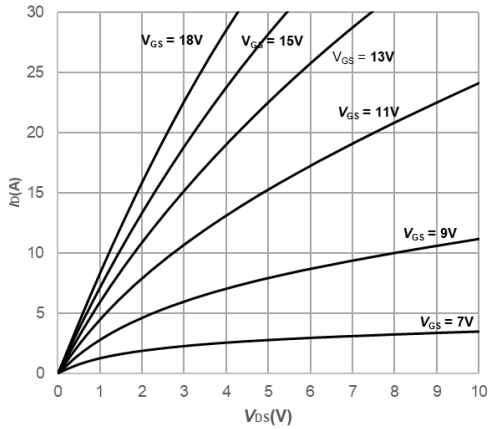


Fig2. Output Characteristics T_j=175℃

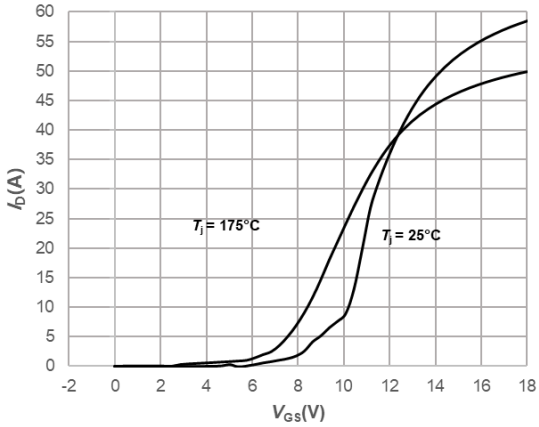


Fig3. Typical Transfer Characteristics

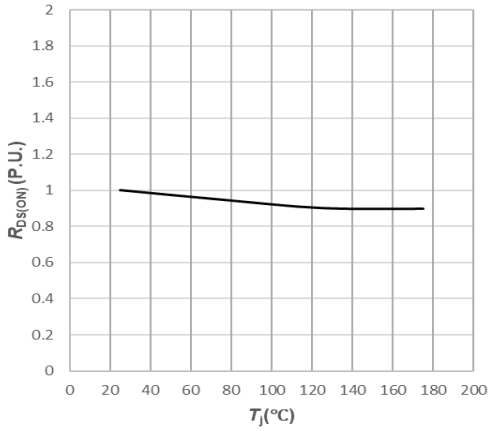


Fig4. Normalized On-Resistance vs. Temperature

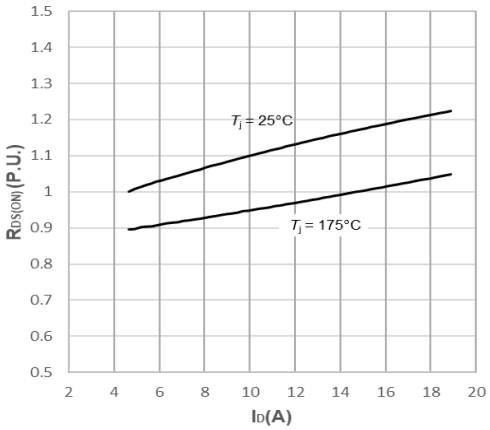


Fig5. Normalized On-Resistance vs. Drain Current For Various Temperatures

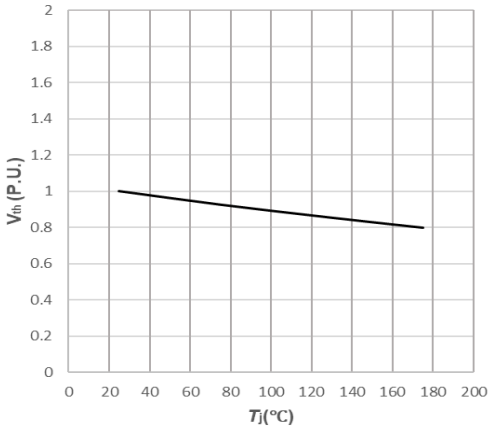


Fig6. Normalized Threshold Voltage vs. Temperature

Typical Characteristics Diagrams

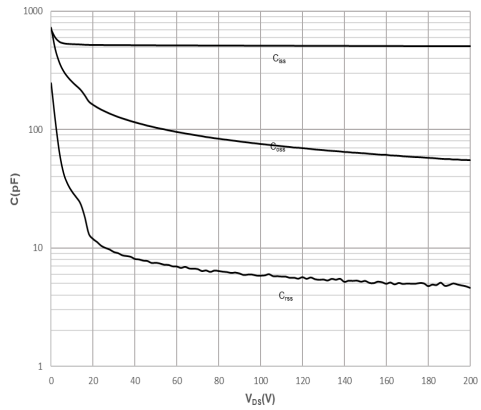


Fig7. Capacitances vs. Drain-Source Voltage (0-200V)

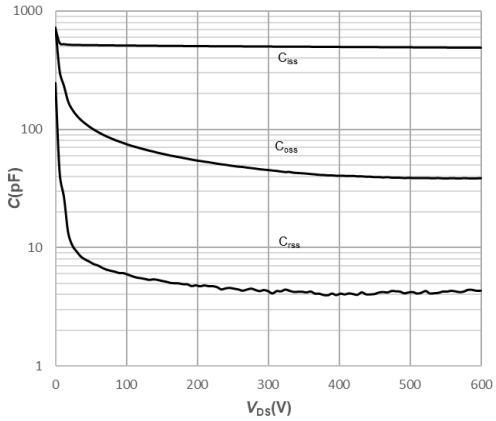


Fig8. Capacitances vs. Drain-Source Voltage (0-600V)

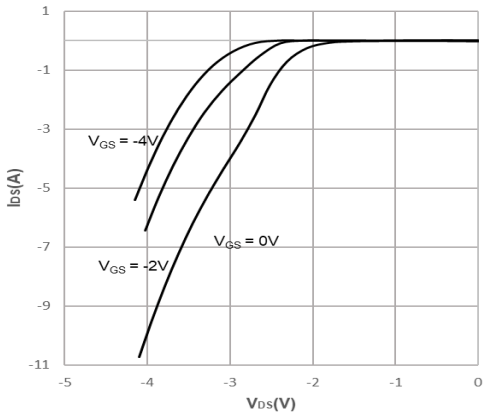
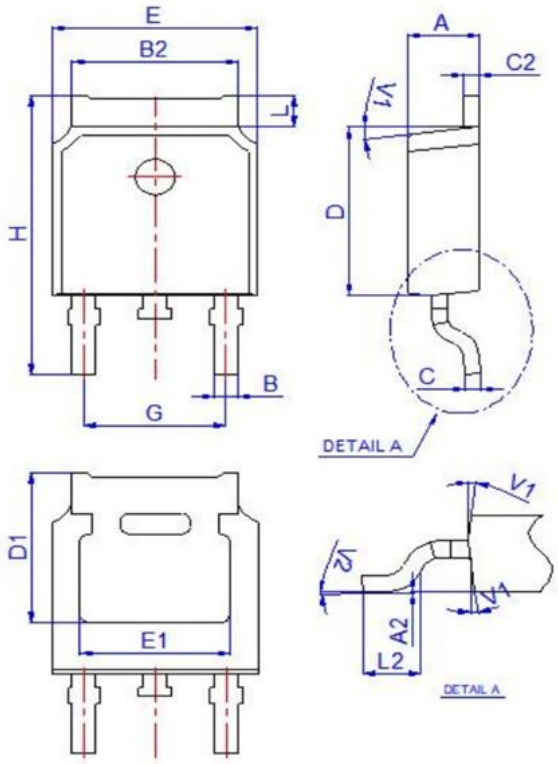


Fig9. Body Diode Characteristics

Dimensions

TO-252 package



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°