

650V 28A N-Channel SiC Power MOSFET

Features

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

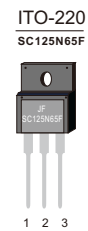
Mechanical Data

- Case: ITO-220 Package

Application

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

Product Summary			
V _{DS}	R _{DS(on)} (mΩ)Typ	I _D (A)	Q _g (Typ)
650V	125@ 15V 12A	28	33nc



Block Diagram

Pin Definition:

1. Gate
2. Drain
3. Source

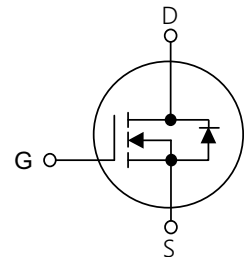


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

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	28
		T _C =100°C	22
Pulsed Drain Current (Note 1)	I _{DM}	56	A
Power Dissipation T _C =25°C	P _D	42	W
Operating Junction and Storage Temperature	T _J /T _{STG}	-55 ~ +175	°C

Table 2.Thermal Characteristics

Parameter	Symbol	SC125N65F	Unit
Thermal resistance Junction to Case	R _{θJC}	3.55	°C/W

Table 3. Electrical Characteristics (T_J=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 =5.2mA	2.7	-	4.5	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =15V,I _D =12A,T _J =25°C	-	125	165	mΩ
			V _{GS} =15V,I _D =12A,T _J =175°C	-	110	-	
			V _{GS} =18V,I _D =12A,T _J =25°C	-	93	-	
			V _{GS} =18V,I _D =12A,T _J =175°C	-	90	-	
Gate Resisitance		R _G	f=1MHz	-	3.5	-	Ω
Dynamic Characteristics							
Input Capacitance		C _{ISS}	V _{DS} =500V,V _{GS} =0V, f=100KHz	-	739	-	pF
Output Capacitance		C _{OSS}		-	58	-	pF
Reverse Transfer Capacitance		C _{RSS}		-	4.5	-	pF
Turn-On Delay Time		td(on)	V _{DS} =500V,I _D =12A V _{GS} =0/15V,R _G =2Ω, T _J =25°C	-	16	-	ns
Turn-On Rise Time		tr		-	48	-	ns
Turn-Off Delay Time		td(off)		-	21	-	ns
Turn-Off Fall Time		tf		-	34	-	ns
Total Gate Charge		Q _G	V _{DD} =500V,I _D =12A, V _{GS} =0/15V	-	33	-	nC
Gate-Source Charge		Q _{GS}		-	13	-	nC
Gate-Drain Charge		Q _{GD}		-	13	-	nC
Drain-Source Diode Characteristics and Maximum Ratings(Note 2)							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V,I _S =6A	-	3.2	-	V
Continuous Diode Forward Current		I _S		-	6	-	A
Reverse Recovery Time		trr	V _R =500V,V _{GS} =0V I _{SD} =12A, di/dt=1200A/us	-	14	-	ns
Recovered charge		Q _{rr}		-	56	-	nC
Peak reverse recovery current		I _{rrm}		-	6.5	-	A

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

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

Typical Characteristics Diagrams

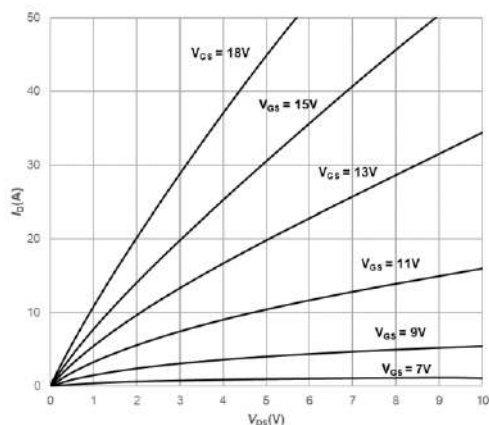


Fig1. Output Characteristics $T_j = 25^\circ\text{C}$

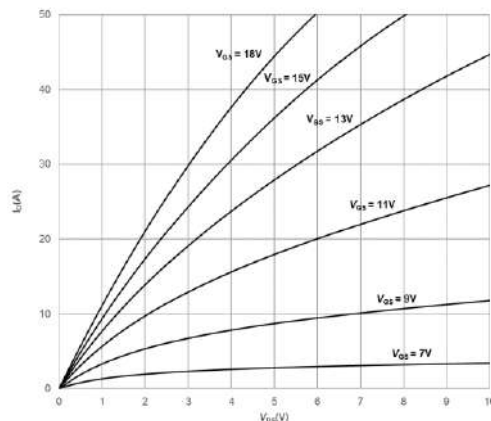


Fig2. Output Characteristics $T_j = 175^\circ\text{C}$

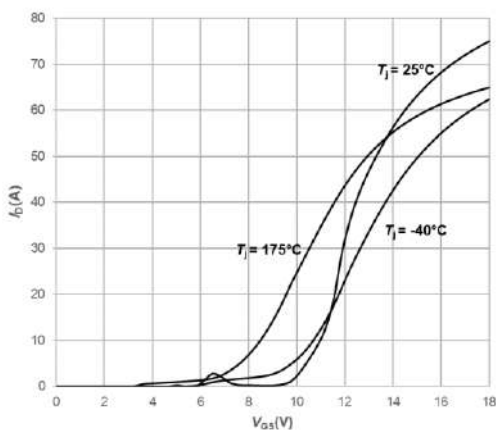


Fig3. Typical Transfer Characteristics

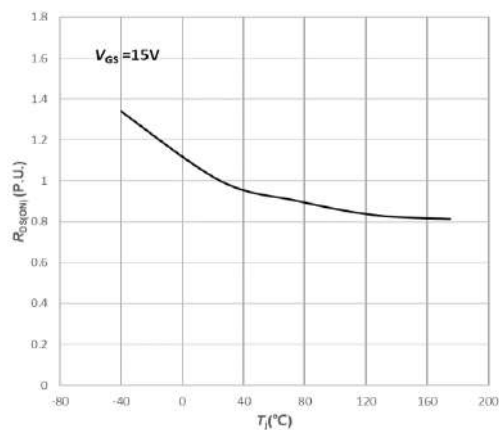


Fig4. Normalized On-Resistance vs. Temperature

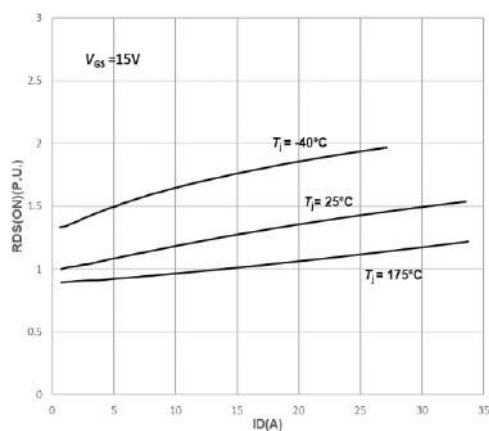


Fig5. Normalized On-Resistance vs. Drain Current For Various Temperatures

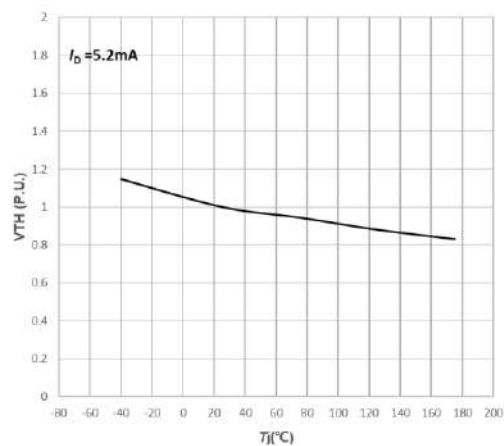


Fig6. Normalized Threshold Voltage vs. Temperature

Typical Characteristics Diagrams

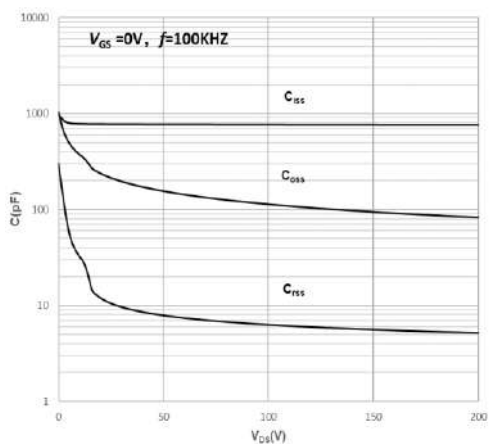


Fig7. Capacitances vs. Drain-Source Voltage (0-200V)

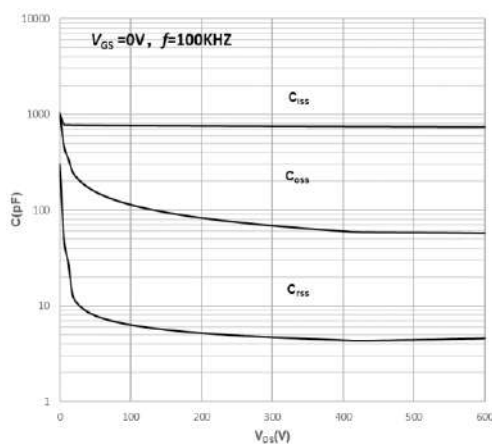


Fig8. Capacitances vs. Drain-Source Voltage (0-600V)

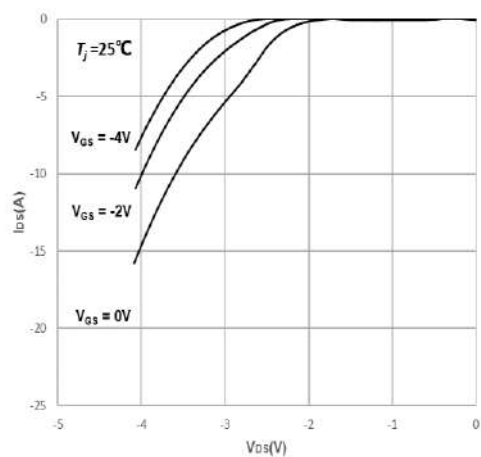
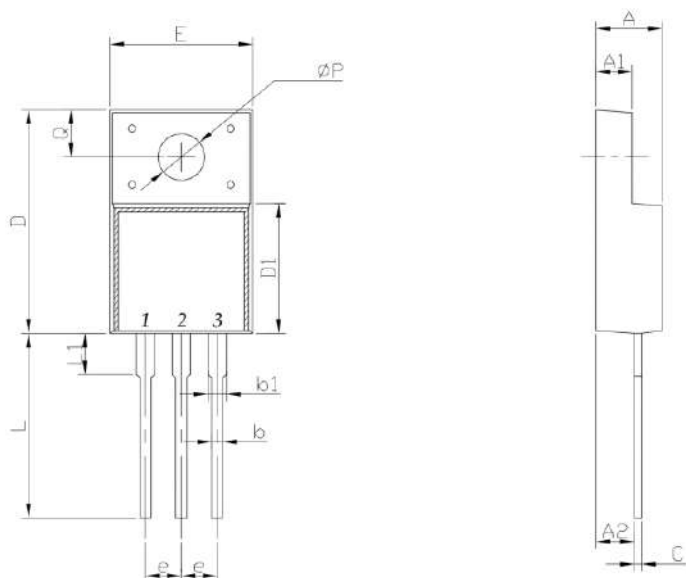


Fig9. Body Diode Characteristics

Dimensions

ITO-220 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.24	4.9	0.167	0.193
A1	2.3	2.92	0.091	0.115
A2	2.61	2.81	0.103	0.111
b	0.3	1	0.012	0.039
b1	0.9	1.55	0.035	0.061
C	0.3	0.7	0.012	0.028
D	14.5	16.36	0.571	0.644
D1	8.8	9.41	0.346	0.370
E	9.5	10.5	0.374	0.413
e	2.3	2.75	0.091	0.108
L	12.6	14	0.496	0.551
L1	2.45	4.3	0.096	0.169
P	2.9	3.8	0.114	0.150
Q	2.5	3.55	0.098	0.140