

650V 11A 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:TO-252 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	380@ 15V 5A	11	21nc

TO-252
(DPAK)



Block Diagram

Pin Definition:

1. Gate
2. Drain
3. Source

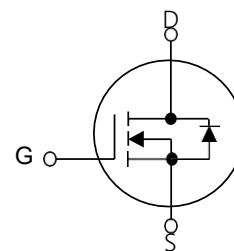


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

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	11
		T _C =100°C	9
Pulsed Drain Current (Note 1)	I _{DM}	22	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	KWSC380N65M	Unit
Thermal resistance Junction to Case	R _{θJC}	2.88	°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 =500μA	650	-	-	V
Drain-Source Leakage Current		I _{DSS}	V _D S=650V,V _{GS} =0V	-	-	10	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =18V,V _D S=0V	-	10	250	nA
	Reverse		V _{GS} =-4V,V _D S=0V	-	-10	-250	nA
On Characteristics							
Gate Threshold Voltage		V _{GS} (TH)	V _D S=V _{GS} ,I _D =1.8mA	2.7	-	4.5	V
Static Drain-Source On-State Resistance		R _{DS} (ON)	V _{GS} =15V,I _D =5A,T _J =25°C	-	380	500	mΩ
			V _{GS} =15V,I _D =5A,T _J =175°C	-	325	-	
			V _{GS} =18V,I _D =5A,T _J =25°C	-	260	-	
			V _{GS} =18V,I _D =5A,T _J =175°C	-	270	-	
Gate Resitance		R _G	f=1MHz	-	14.3	-	Ω
Dynamic Characteristics							
Input Capacitance		C _{ISS}	V _D S=500V,V _{GS} =0V, f=1MHz	-	254	-	pF
Output Capacitance		C _{OSS}		-	20	-	pF
Reverse Transfer Capacitance		C _{RSS}		-	2.4	-	pF
Turn-On Delay Time		t _d (on)	V _D S=500V,I _D =5A V _{GS} =0/15V,R _G =10Ω, T _J =25°C	-	24	-	ns
Turn-On Rise Time		t _r		-	42	-	ns
Turn-Off Delay Time		t _d (off)		-	26.8	-	ns
Turn-Off Fall Time		t _f		-	76	-	ns
Total Gate Charge		Q _G	V _{DD} =500V,I _D =5A, V _{GS} =0/15V	-	21	-	nC
Gate-Source Charge		Q _{GS}		-	6.7	-	nC
Gate-Drain Charge		Q _{GD}		-	11.5	-	nC
Drain-Source Diode Characteristics and Maximum Ratings(Note 2)							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V,I _S =3A	-	3.5	-	V
Continuous Diode Forward Current		I _S		-	11	-	A
Reverse Recovery Time		t _{rr}	V _R =500V,V _{GS} =0V I _{SD} =5A, di/dt=530A/us	-	17.8	-	ns
Recovered charge		Q _{rr}		-	34	-	nC
Peak reverse recovery current		I _{rrm}		-	3.5	-	A

Notes: 1 RepetitiveRating: Pulse width limited by maximum junction temperature

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

Typical Characteristics Diagrams

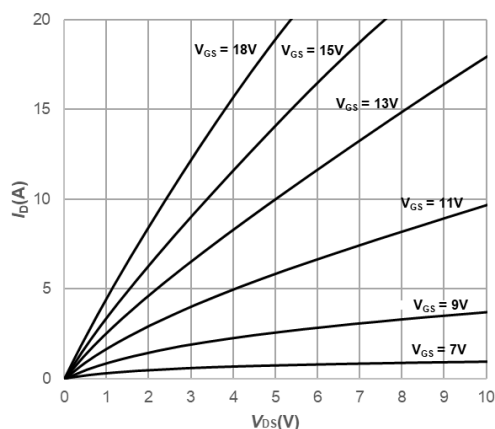


Fig1. Output Characteristics $T_j = 25^\circ\text{C}$

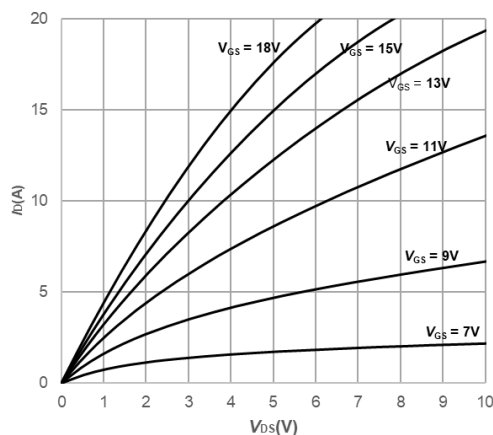


Fig2. Output Characteristics $T_j = 175^\circ\text{C}$

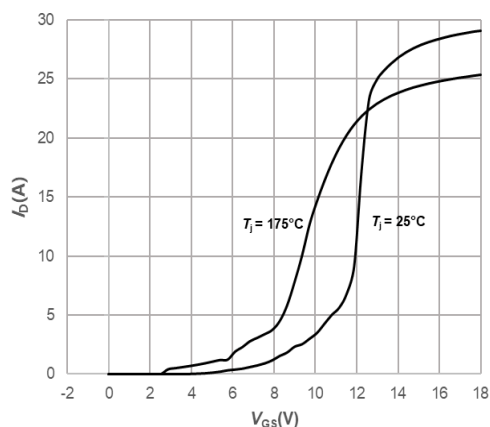


Fig3. Typical Transfer Characteristics

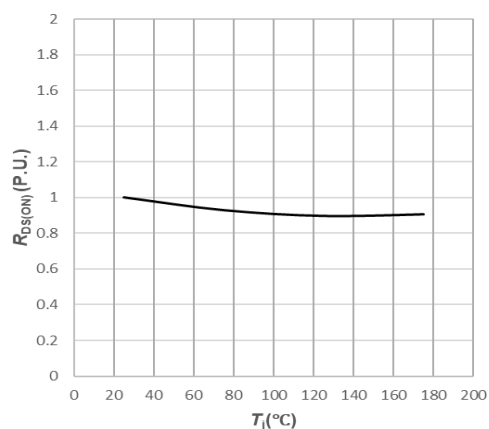


Fig4. Normalized On-Resistance vs. Temperature

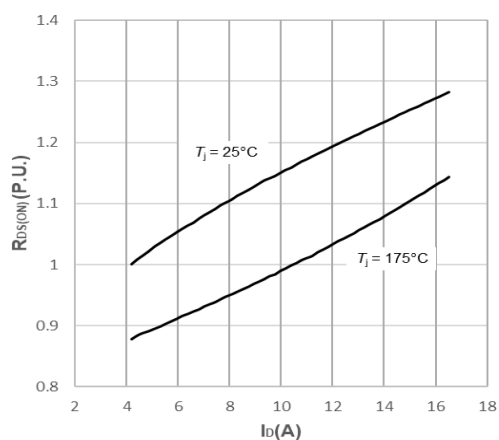


Fig5. Normalized On-Resistance vs. Drain Current For Various Temperatures

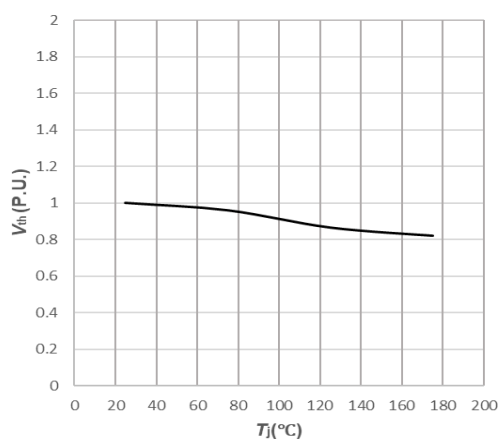


Fig6. Normalized Threshold Voltage vs. Temperature

Typical Characteristics Diagrams

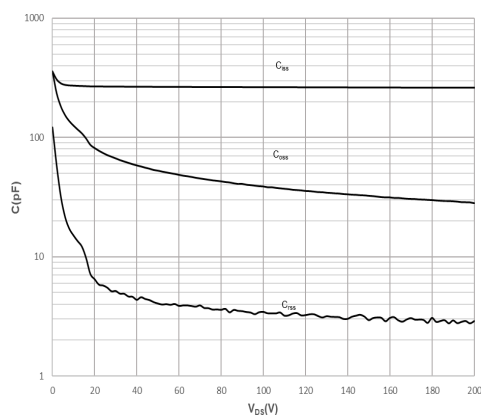


Fig7. Capacitances vs. Drain-Source Voltage (0-200V)

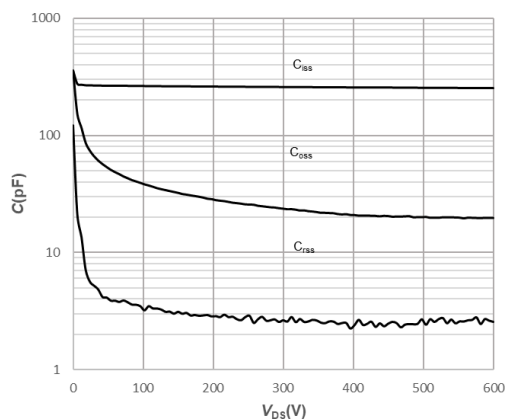


Fig8. Capacitances vs. Drain-Source Voltage (0-600V)

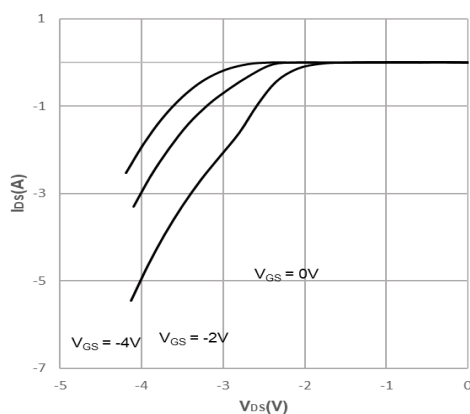
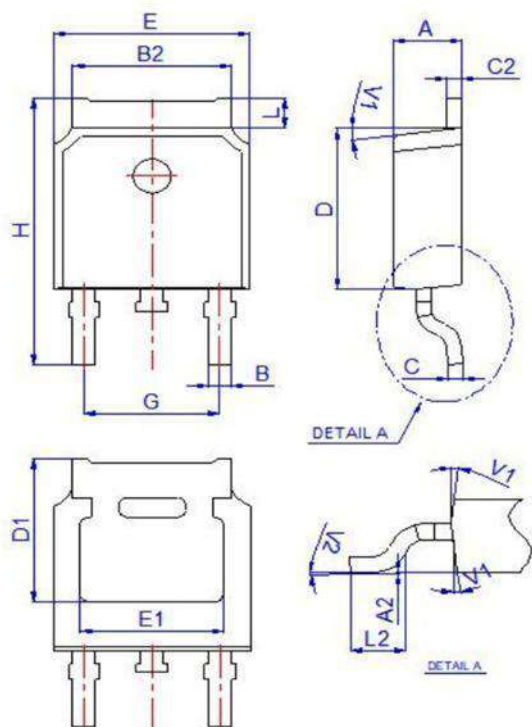


Fig9. Body Diode Characteristics

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°