

N-Channel 650V (D-S) SiC MOSFET

Features

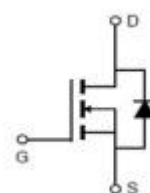
- Wide bandgap SiC MOSFET technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low reverse recovery(Qrr)
- Halogen free, RoHs compliant



TO-263

Applications

- Switch mode power supplies
- Renewable energy
- On Board Charger
- High voltage DC/DC converters



Absolute Maximum Ratings (T_J=25°C unless otherwise noted)

Parameter		Symbol	Ratings	Unit
Drain Source Voltage		V _{DS}	650	V
Gate Source Voltage		V _{GS}	-8/+22	V
Recommend Gate Source Voltage		V _{GSop}	-4/+18	V
Drain Current Continuous V _{GS} =18V	T _C =25°C	I _D	49	A
	T _C =125°C		35	
Power Dissipation	T _C =25°C	P _D	241	W
Operating Temperature and Storage Temperature Range		T _J /T _{STG}	-55 to +175	°C

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance Junction to Case	R _{thJC}	0.62	°C/W
Thermal Resistance Junction to Ambient	R _{thJA}	40	°C/W

Electrical Characteristics (T _J =25°C unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =250μA	650	--	--	V
Gate Leakage Current	I _{GSS}	V _{GS} =18V, V _{DS} =0V	--	--	250	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =650V, V _{GS} =0V	--	1	100	μA
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _{DS} =4.8mA	2	3	4	V
		V _{DS} =V _{GS} , I _{DS} =4.8mA, T _J =175°C	--	2.1	--	
Drain-Source On-state Resistance	R _{DS(on)}	V _{GS} =18V, I _D =17.6A	--	45	59	mΩ
		V _{GS} =18V, I _D =17.6A, T _J =175°C	--	55	--	
Drain-Source On-state Resistance	R _{DS(on)}	V _{GS} =15V, I _D =17.6A	--	56	68	mΩ
		V _{GS} =15V, I _D =17.6A, T _J =175°C	--	60	--	
Total Gate Charge	Q _g	V _{GS(off)} =-4V, V _{GS(on)} =18V V _{DD} =400V, I _D =17.6A	--	69.9	--	nC
Gate Source Charge	Q _{gs}		--	15.4	--	
Gate Drain Charge	Q _{gd}		--	28	--	
Turn-On Switching Energy	E _{ON}	V _{GS} =-4/+18V, V _{DD} =400V · I _D =17.6A, R _G =5Ω, L=100uH	--	87.4	--	mJ
Turn-Off Switching Energy	E _{OFF}		--	24	--	
Turn-on Delay Time	t _{d(on)}		--	10.56	--	ns
Turn-on Rise Time	t _r		--	4.16	--	
Turn-off Delay Time	t _{d(off)}		--	19.52	--	
Turn-off Fall Time	t _f		--	6.4	--	
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =650V, V _{AC} =25mV, f=1MHz	--	1059	--	pF
Output Capacitance	C _{oss}		--	130	--	
Reverse Transfer Capacitance	C _{rss}		--	16	--	
Gate resistance	R _G	V _{AC} = 25mV, f=1MHz	--	0.9	--	Ω

Reverse Diode Characteristics (T_J=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V _{SD}	I _{SD} =8.8A, V _{GS} =-4V	--	3.2	--	V
		I _{SD} =8.8A, V _{GS} =-4V, T _J =175°C	--	2.7	--	
Continuous Diode Forward Current	I _{SD}	V _{GS} =-4V	--	49	--	A
Reverse Recovery Time	t _{rr}	V _R =400V, I _F =17.6A, V _{GS} =-4V, di/dt=1000A/μs	--	20.4	--	ns
Reverse Recovery Charge	Q _{rr}		--	114.4	--	nC

Typical Characteristics Curves ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Figure 1. Output Characteristic ($T_J = -55^\circ\text{C}$)

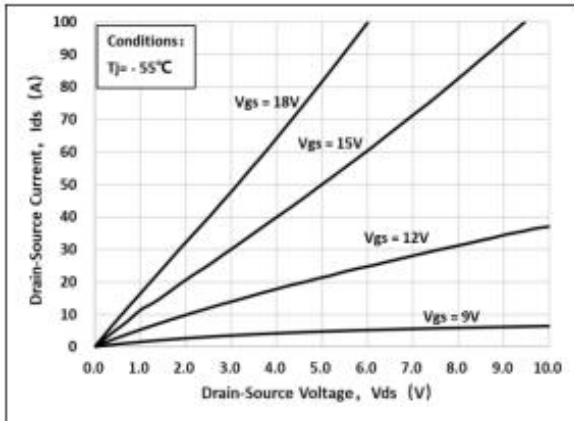


Figure 2. Output Characteristic ($T_J = 25^\circ\text{C}$)

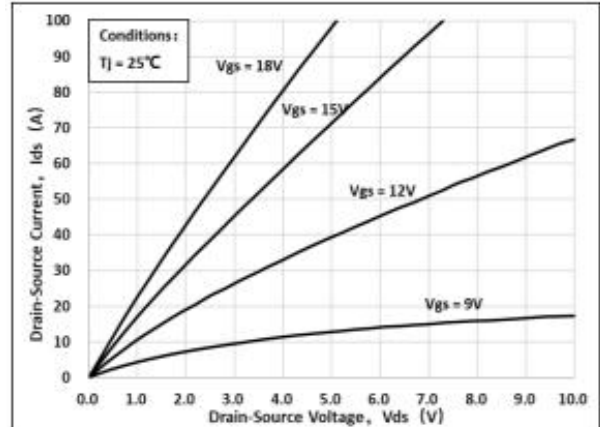


Figure 3. Output Characteristic ($T_J = 175^\circ\text{C}$)

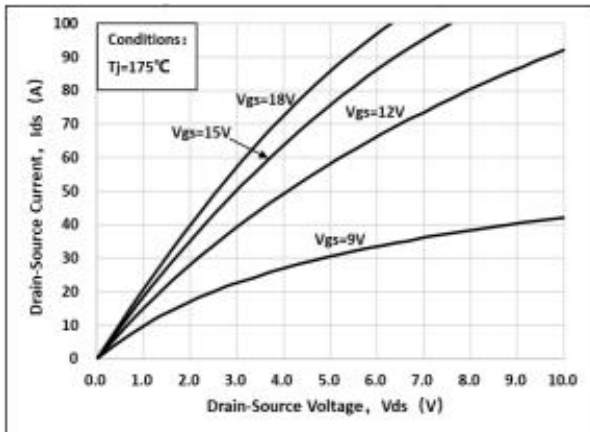


Figure 4. $R_{DS(on)}$ Vs I_{DS} Characteristic

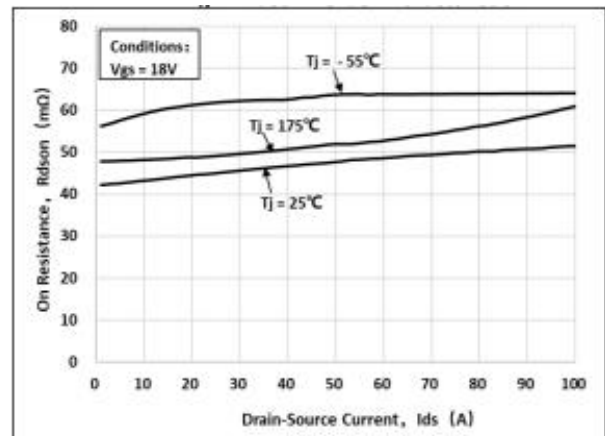


Figure 5. $R_{DS(on)}$ vs. Temperature

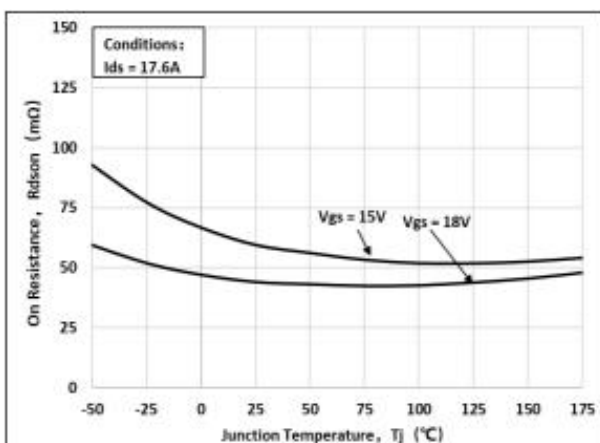
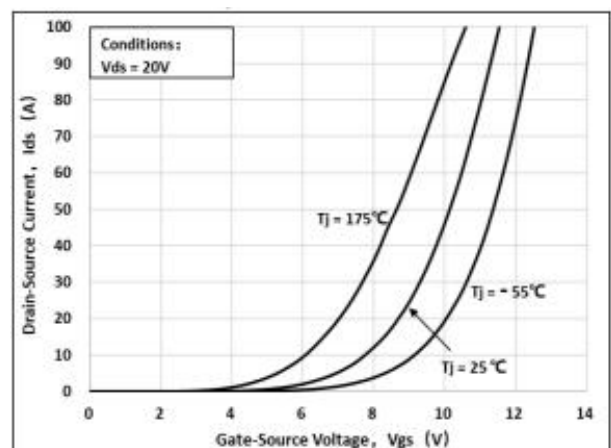


Figure 6. Transfer Characteristic



Typical Characteristics Curves ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Figure 7: Body-diode Characteristic ($T_J = -55^\circ\text{C}$)

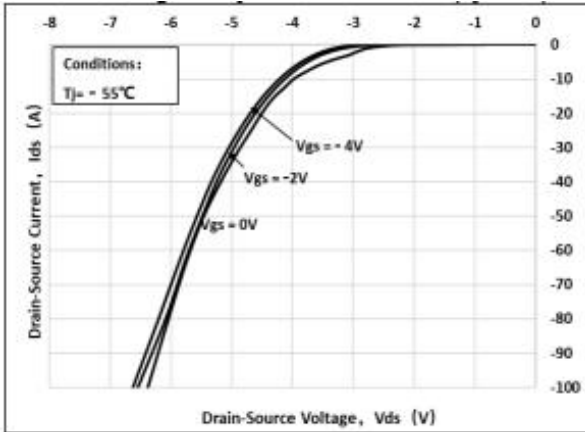


Figure 8: Body-diode Characteristic ($T_J = 25^\circ\text{C}$)

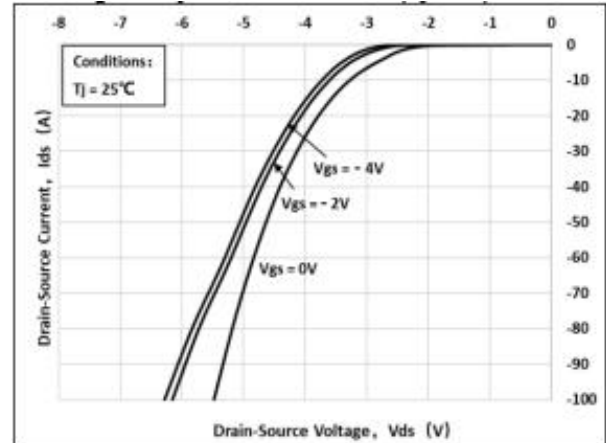


Figure 9: Body-diode Characteristic ($T_J = 175^\circ\text{C}$)

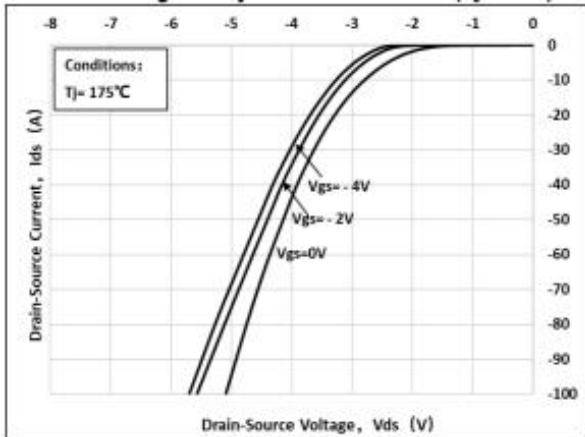


Figure 10: V_{TH} Vs T_J Temperature Characteristic

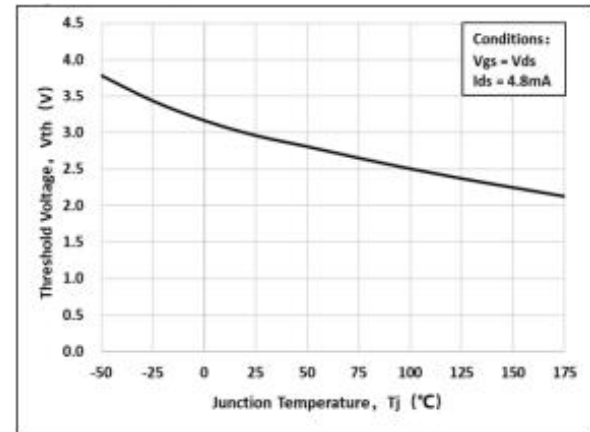


Figure 11: 3rd Quadrant Characteristic ($T_J = -55^\circ\text{C}$)

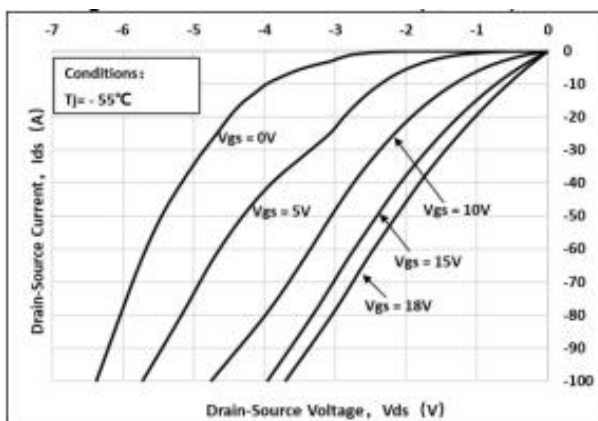
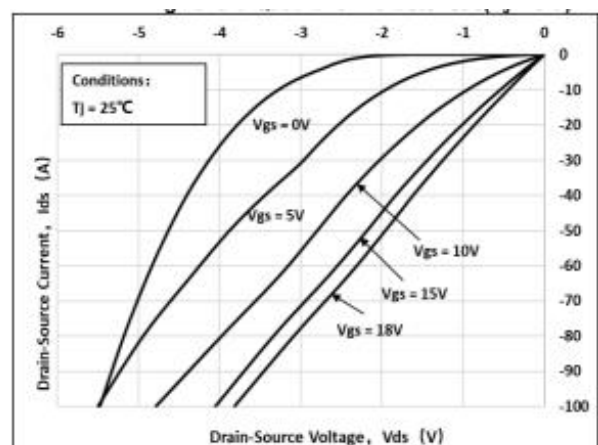


Figure 12: 3rd Quadrant Characteristic ($T_J = 25^\circ\text{C}$)



Typical Characteristics Curves ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Figure 13: 3rd Quadrant Characteristic($T_J=175^\circ\text{C}$)

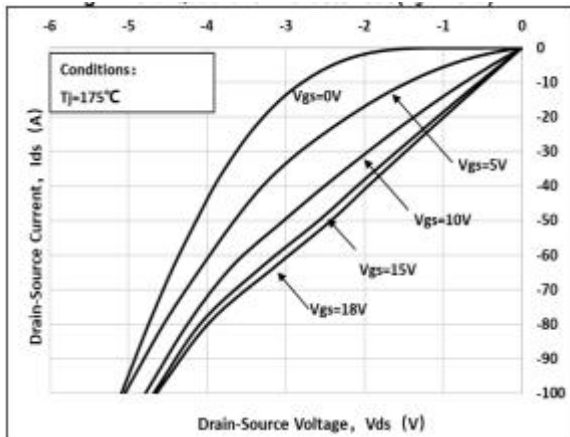


Figure 14: Gate Charge Characteristics

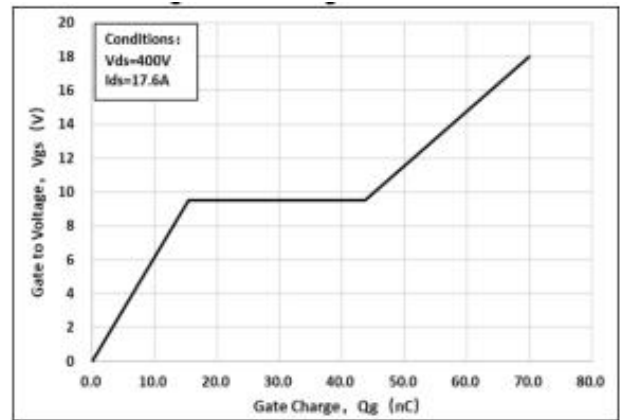


Figure 15: Safe Operating Area

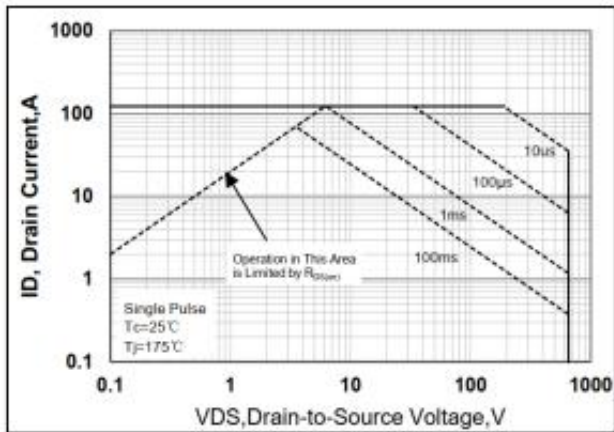


Figure 16: Capacitance Characteristics

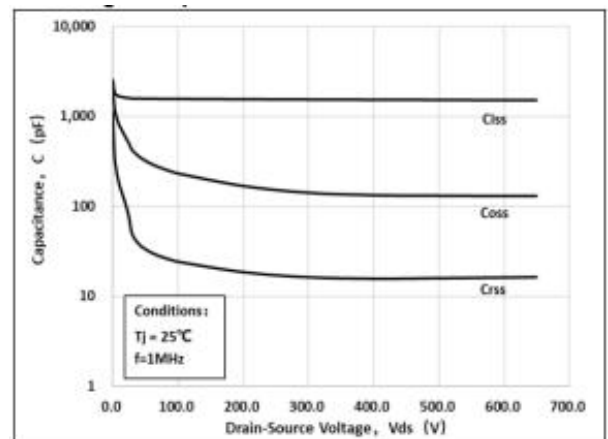
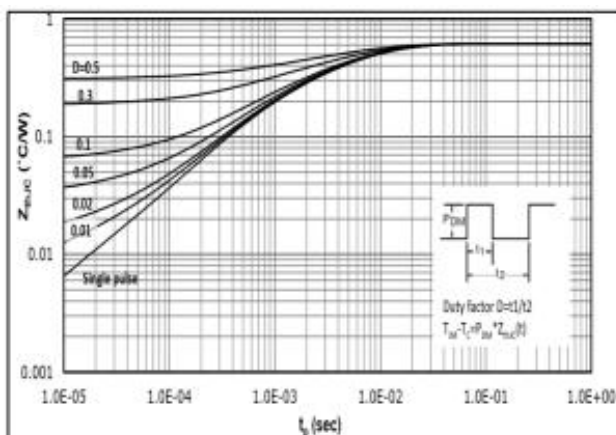
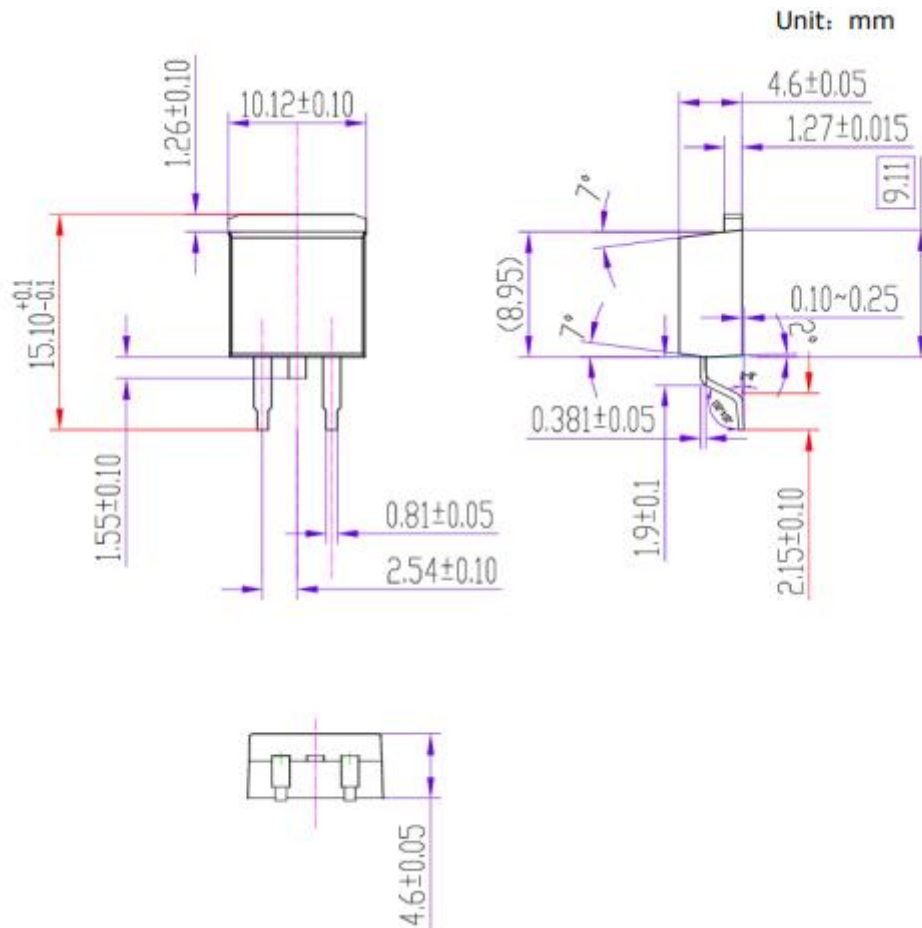


Figure 17: Transient Thermal Impedance



Package Outline Dimensions (Unit: millimeters)

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