

### Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D@25^{\circ}C$
650V	55mΩ@18V	48A

### Feature

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

### Application

- Switch Mode Power Supplies
- Renewable Energy
- Motor Drives
- High Voltage DC/DC Converters

### Package

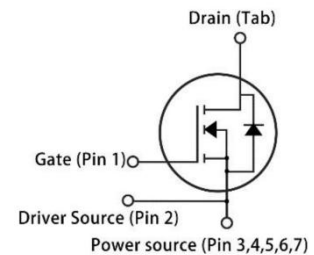


TO-263-7

### Marking



### Circuit diagram



### Absolute maximum ratings ( $T_c=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Test Condition	Value	Unit
Drain-Source Voltage	$V_{DSmax}$	$V_{GS} = 0V, I_D = 100\mu A$	650	V
Gate-Source Voltage	$V_{GSmax}$	AC ( $f > 1 \text{ Hz}$ )	-10/+25	V
Gate-Source Voltage	$V_{GSOP}$	Static	-4/+18	V
Continuous Drain Current	$I_D$	$V_{GS}=18V, T_C=25^{\circ}C$	48	A
	$I_D$	$V_{GS}=18V, T_C=100^{\circ}C$	34	A
Pulsed Drain Current	$I_{D,pulse}$	Pulse with $t_p$ limited by $T_{jmax}$	85	A
Power Dissipation	$P_D$	$T_c=25^{\circ}C$	163	W
Thermal Resistance (Typ)	$R_{\theta JC}$	Junction-to-Case	0.92	$^{\circ}C/W$
Junction Temperature	$T_J$		-55 ~ +175	$^{\circ}C$
Storage Temperature	$T_{STG}$		-55 ~ +175	$^{\circ}C$

### Electrical characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 100μA	650			V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = 650V, V <sub>GS</sub> = 0V		1	50	μA
Gate-Source leakage current	I <sub>GSS</sub>	V <sub>GS</sub> = 18V, V <sub>DS</sub> = 0V			250	nA
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 5mA		2.7		V
		V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 5mA, T <sub>J</sub> = 175°C		1.8		
Drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 18V, I <sub>D</sub> = 15A		55	80	mΩ
		V <sub>GS</sub> = 18V, I <sub>D</sub> = 15A, T <sub>J</sub> = 175°C		100		
Transconductance	g <sub>fs</sub>	V <sub>GS</sub> = 18V, I <sub>D</sub> = 15A		18		S
		V <sub>GS</sub> = 18V, I <sub>D</sub> = 15A, T <sub>J</sub> = 175°C		11		
<b>Dynamic characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 600V, V <sub>GS</sub> = 0V, f = 1MHz V <sub>AC</sub> = 25mV		1410		pF
Output Capacitance	C <sub>oss</sub>			119		
Reverse Transfer Capacitance	C <sub>rss</sub>			4		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 400V, V <sub>GS</sub> = -4V/18V, I <sub>D</sub> = 20A		66.2		nC
Gate-Source Charge	Q <sub>gs</sub>			16.4		
Gate-Drain Charge	Q <sub>gd</sub>			16.5		
Internal Gate Resistance	R <sub>G(int)</sub>	f = 1 MHz, V <sub>AC</sub> = 25mV		1.8		Ω
<b>Source-Drain Diode characteristics</b>						
Diode Forward Current	I <sub>S</sub>	V <sub>GS</sub> = -4V, T <sub>C</sub> = 25°C			48	A
Diode Forward voltage	V <sub>SD</sub>	V <sub>GS</sub> = -4V, I <sub>SD</sub> = 8.8A		3.7		V
		V <sub>GS</sub> = -4V, I <sub>SD</sub> = 8.8A, T <sub>J</sub> = 175°C		3.1		
Diode pulse Current	I <sub>S,pulse</sub>	V <sub>GS</sub> = -4V, pulse width t <sub>p</sub> limited by T <sub>Jmax</sub>		95		A

## Typical Characteristics

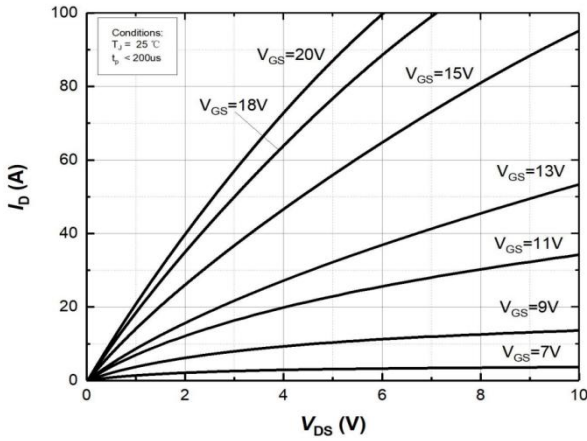


Figure 1. Output characteristics at  $T_j=25^\circ\text{C}$

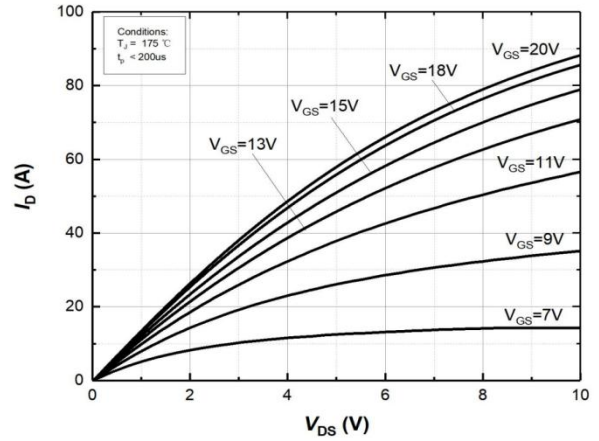


Figure 2. Output characteristics at  $T_j=175^\circ\text{C}$

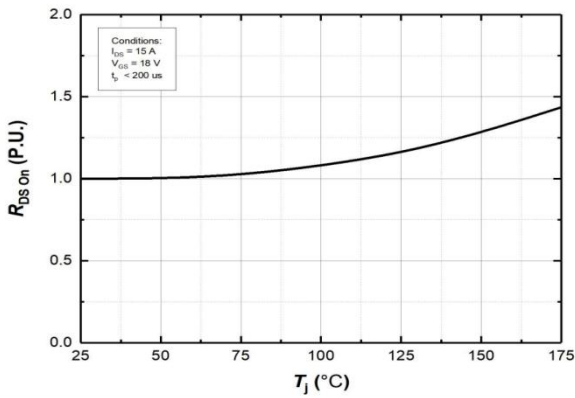


Figure 3. Normalized On-Resistance vs. Temperature

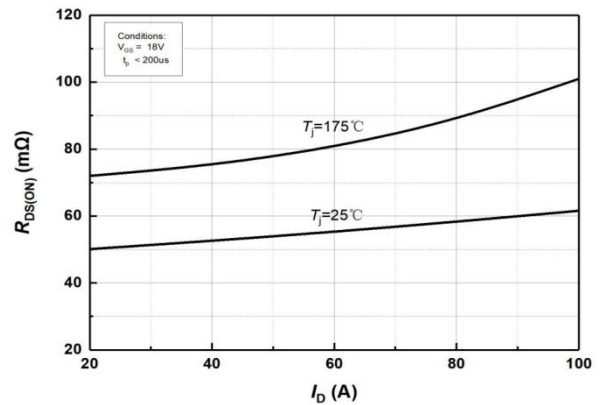


Figure 4. On-Resistance vs. Drain current for Various Temperature

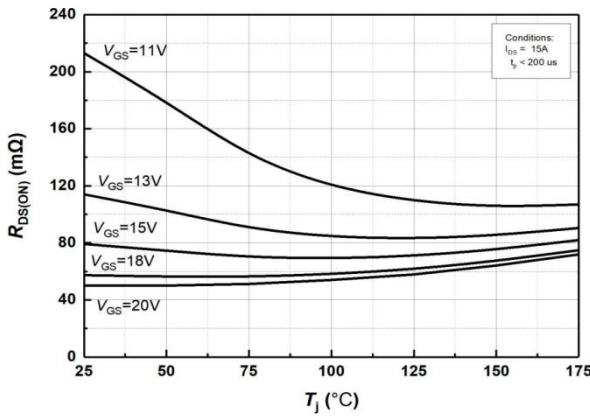


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

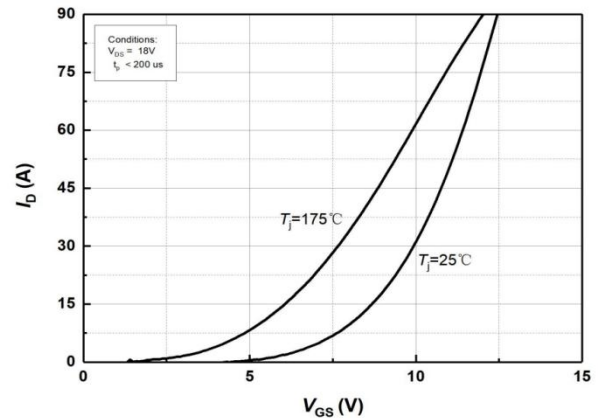


Figure 6. Transfer Characteristics for Various Junction Temperatures

## Typical Characteristics

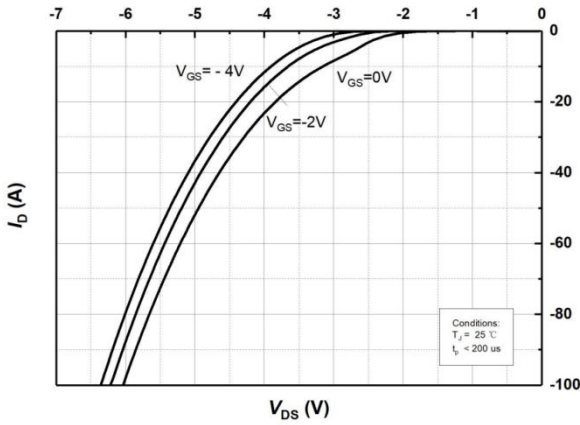


Figure 7. Body Diode Characteristics at Tj=25°C

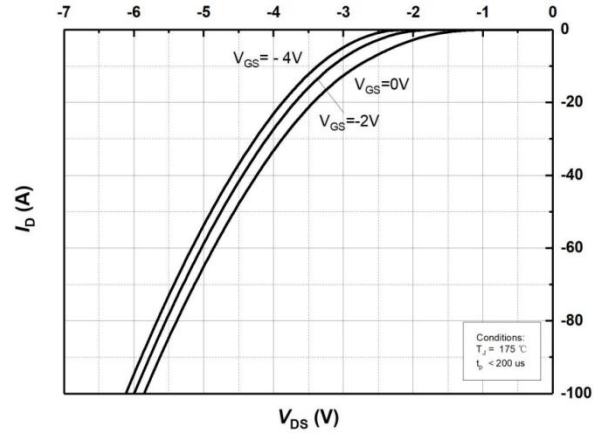


Figure 8. Body Diode Characteristics at Tj=175°C

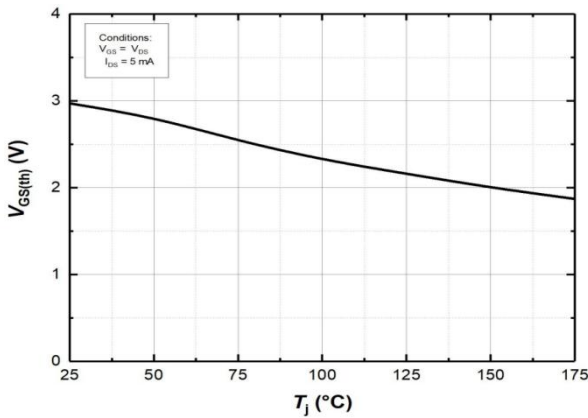


Figure 9. Threshold Voltage vs. Temperature

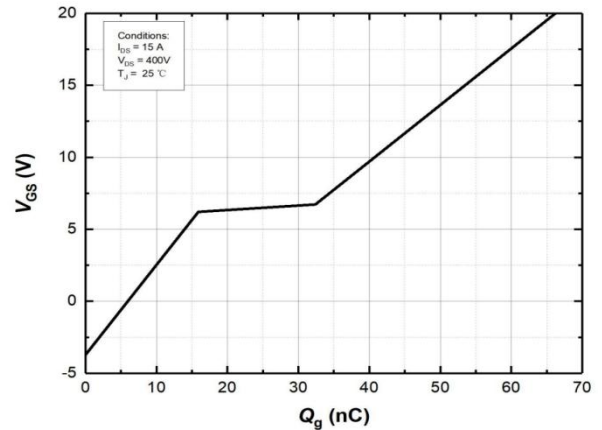


Figure 10 Gate Charge Characteristics

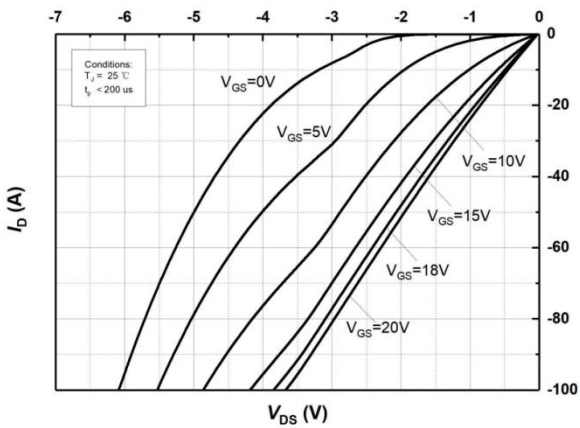


Figure 11. 3rd Quadrant Characteristic at Tj=25°C

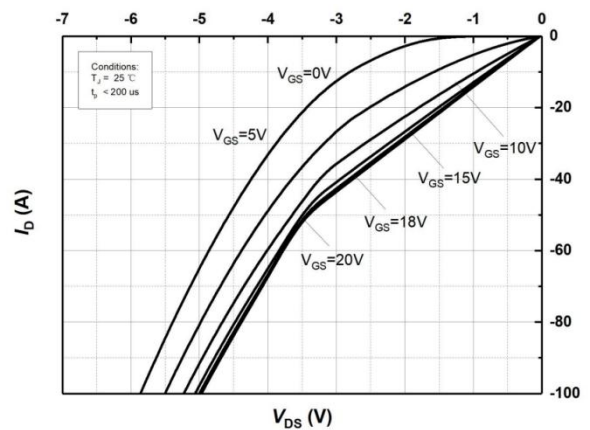


Figure 12. 3rd Quadrant Characteristic at Tj=175°C

## Typical Characteristics

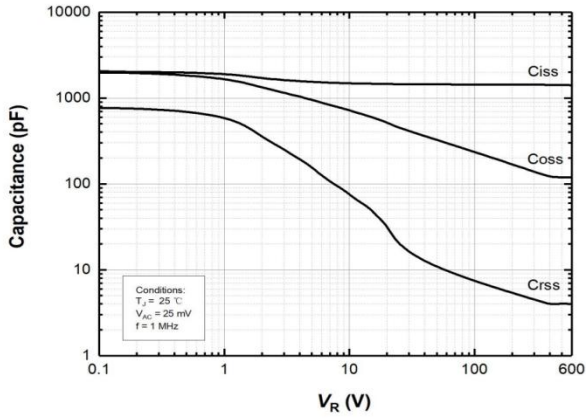


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 1000V)

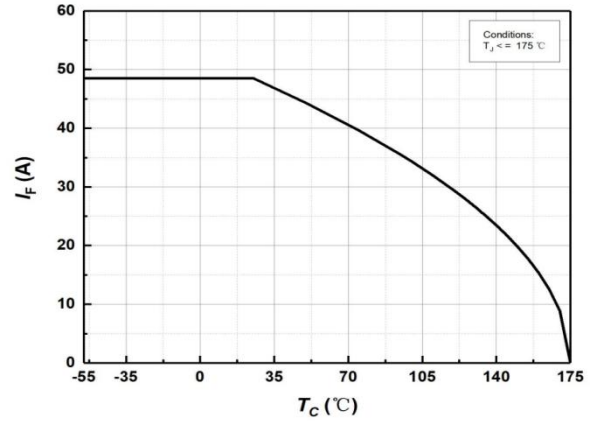


Figure 14. Continuous Drain Current Derating vs Case Temperature

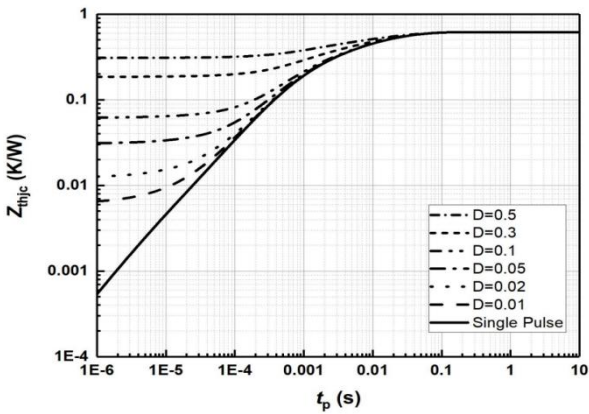


Figure 15. Transient Thermal Impedance (Junction – Case)

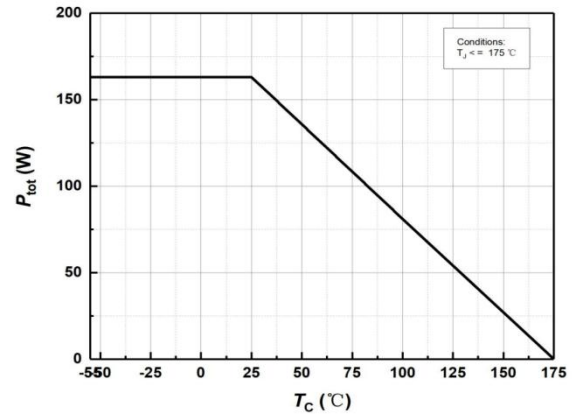


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

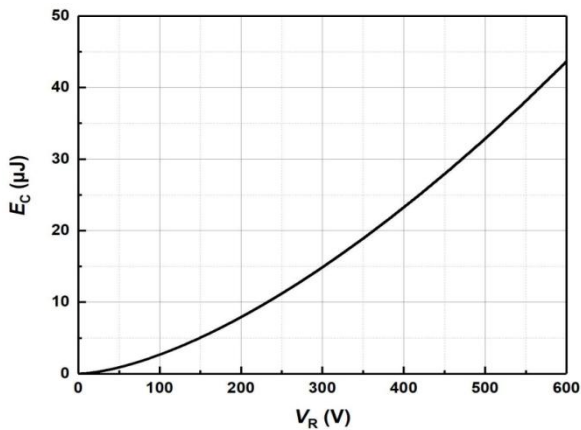


Figure 17. Output Capacitor Stored Energy

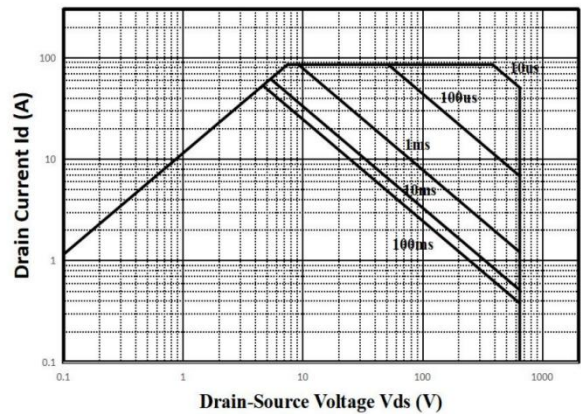
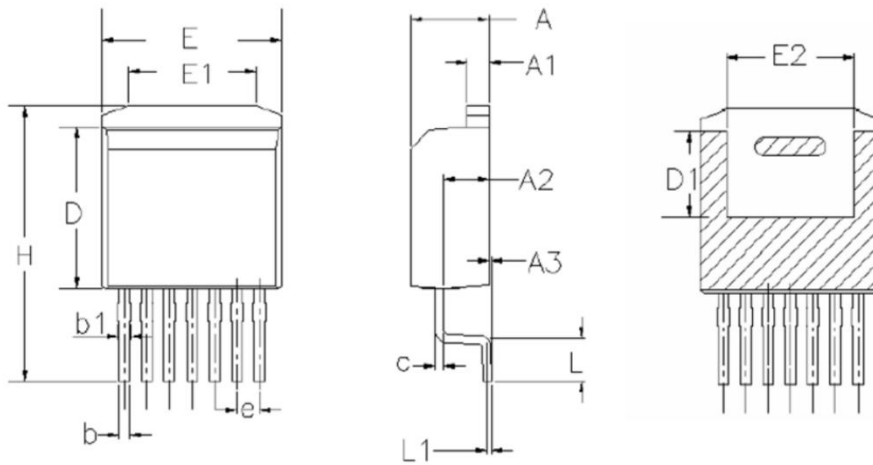


Figure 18. Safe Operating Area



### TO-263-7 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.600	0.169	0.181
A1	1.200	1.400	0.047	0.055
A2	2.400	2.750	0.094	0.108
A3	0.000	0.250	0.000	0.010
b	0.500	0.700	0.020	0.028
b1	0.600	0.900	0.024	0.035
c	0.400	0.600	0.016	0.024
D	8.880	9.280	0.350	0.365
D1	4.650	6.650	0.183	0.262
e	1.270 BSC		0.050 BSC	
E	10.080	10.280	0.397	0.405
E1	6.500	8.300	0.256	0.327
E2	6.820	7.97	0.269	0.314
H	14.800	16.000	0.583	0.630
L	1.900	2.750	0.075	0.108