

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D@25^{\circ}C$
650V	45mΩ@18V	55A

Feature

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

Application

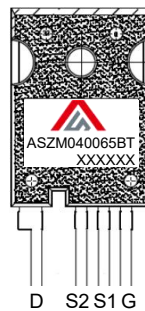
- Switch Mode Power Supplies
- Renewable Energy
- Motor Drives
- High Voltage DC/DC Converters

Package



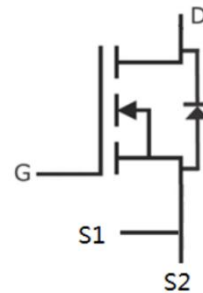
TO-247-4

Marking



D S2 S1 G

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	$V_{GS} = 18V, T_C=25^{\circ}C$	55	A
	I_D	$V_{GS} = 18V, T_C=100^{\circ}C$	39	A
Pulsed Drain Current	$I_{D,pulse}$	Pulse with t_p limited by T_{jmax} at 1 ms	112	A
		Pulse with t_p limited by T_{jmax} at 100 μs	271	A
Power Dissipation	P_D	$T_C=25^{\circ}C$	208	W
Thermal Resistance (Typ)	$R_{\theta JC}$	Junction-to-Case	0.72	$^{\circ}C/W$
Junction Temperature	T_J		-55~ +175	$^{\circ}C$
Storage Temperature	T_{STG}		-55~ +175	$^{\circ}C$

Electrical characteristics (T_j=25°C, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 100μA	650			V
Zero gate voltage drain current	I _{DSS}	V _{DS} = 650V, V _{GS} = 0V		1	50	μA
Gate-Source leakage current	I _{GSS}	V _{GS} = 18V, V _{DS} = 0V			250	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 5mA		2.7		V
		V _{DS} = V _{GS} , I _D = 5mA, T _j = 175°C		1.8		
Drain-source on-resistance	R _{DS(on)}	V _{GS} = 18V, I _D = 20A		45	58	mΩ
		V _{GS} = 18V, I _D = 20A, T _j = 175°C		60		
Transconductance	g _{fs}	V _{GS} = 18V, I _D = 20A		18		S
		V _{GS} = 18V, I _D = 20A, T _j = 175°C		11		
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} = 600V, V _{GS} = 0V, f = 1MHz V _{AC} = 25mV		1410		pF
Output Capacitance	C _{oss}			119		
Reverse Transfer Capacitance	C _{rss}			4		
Total Gate Charge	Q _g	V _{DS} = 400V, I _D = 20A V _{GS} = -4V/18V		47		nC
Gate-Source Charge	Q _{gs}			15		
Gate-Drain Charge	Q _{gd}			21		
Internal Gate Resistance	R _{G(int)}	f = 1MHz, V _{AC} = 25mV		1.8		Ω
Source-Drain Diode characteristics						
Diode Forward Current	I _S	V _{GS} = -4V, T _C = 25°C		46		A
Diode Forward voltage	V _{SD}	V _{GS} = -4V, I _{SD} = 8.8A		3.7		V
		V _{GS} = -4V, I _{SD} = 8.8A, T _J = 175°C		3.1		V
Diode Pulse Current	I _{S, pulse}	V _{GS} = -4V, pulse width t _p limited by T _{jmax}		112		A

Typical Characteristics

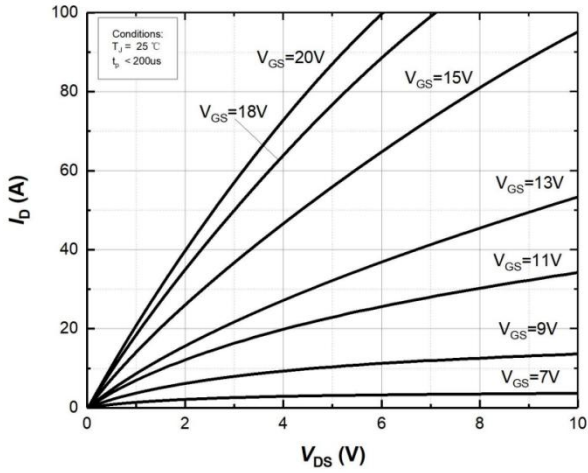


Figure 1. Output characteristics at $T_j=25^\circ\text{C}$

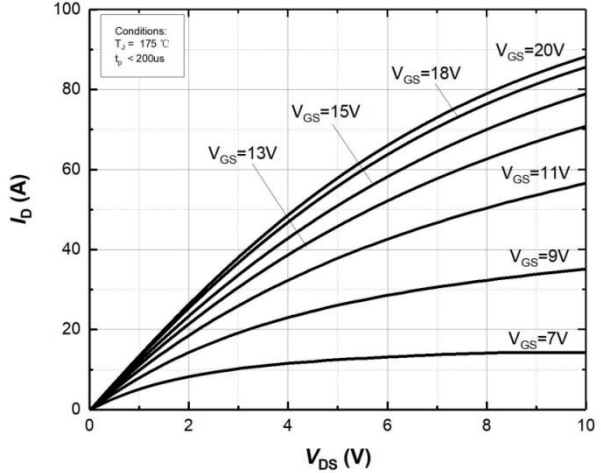


Figure 2. Output characteristics at $T_j=175^\circ\text{C}$

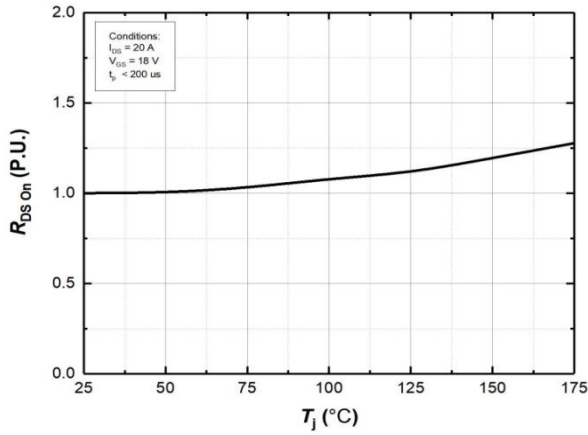


Figure 3. Normalized On-Resistance vs. Temperature

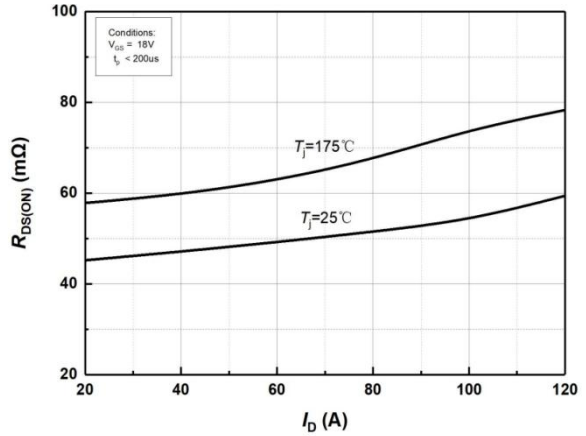


Figure 4. On-Resistance vs. Drain current for Various Temperature

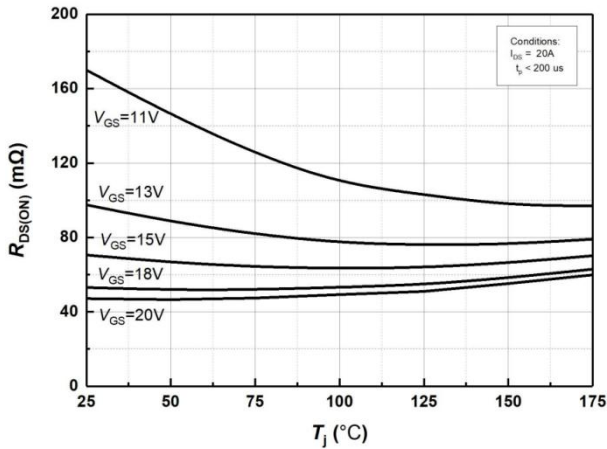


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

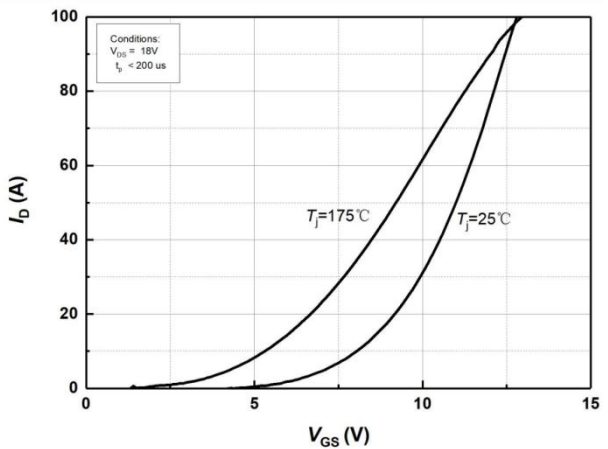


Figure 6. Transfer Characteristics for Various Junction Temperatures

Typical Characteristics

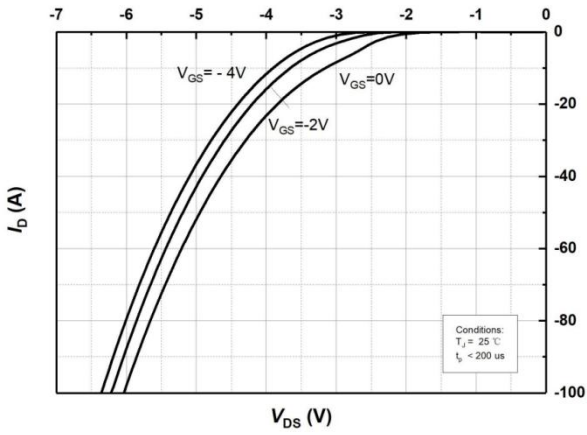


Figure 7. Body Diode Characteristics at $T_j=25^\circ\text{C}$

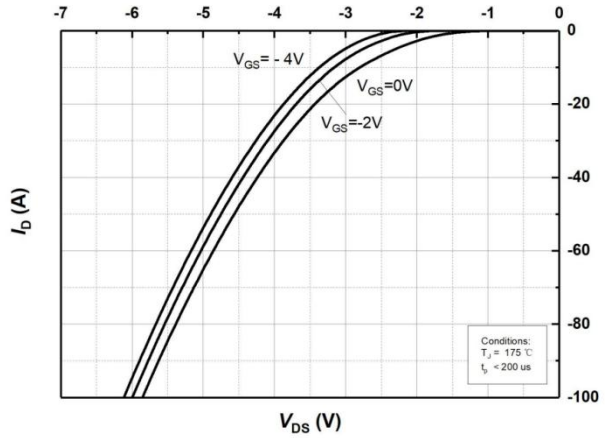


Figure 8. Body Diode Characteristics at $T_j=175^\circ\text{C}$

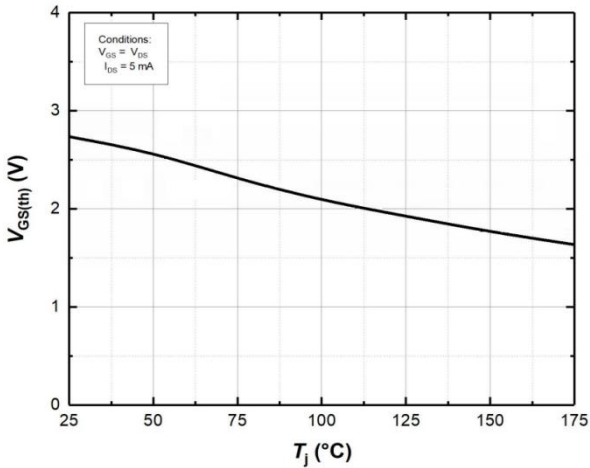


Figure 9. Threshold Voltage vs. Temperature

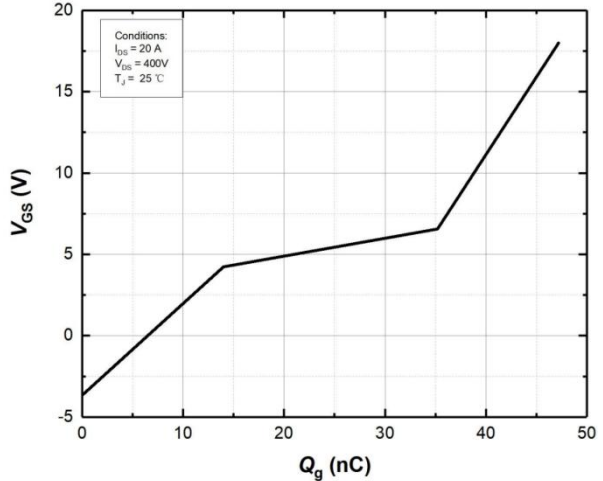


Figure 10 Gate Charge Characteristics

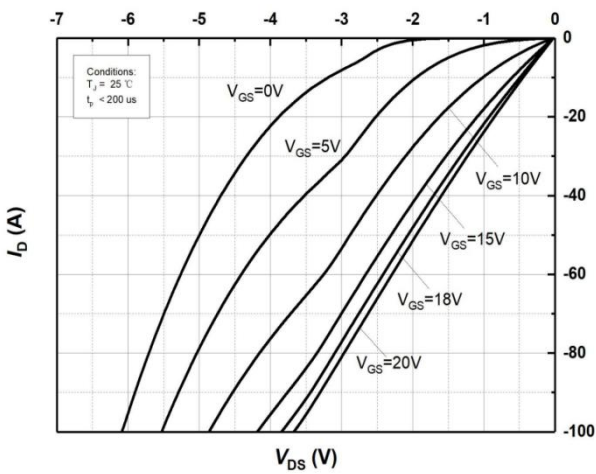


Figure 11. 3rd Quadrant Characteristic at $T_j=25^\circ\text{C}$

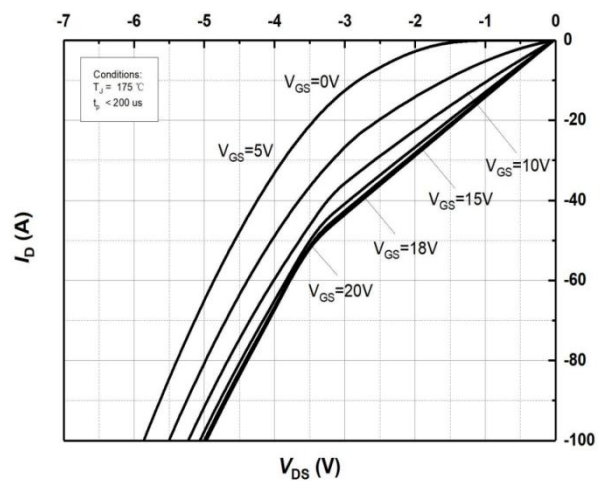


Figure 12. 3rd Quadrant Characteristic at $T_j=175^\circ\text{C}$

Typical Characteristics

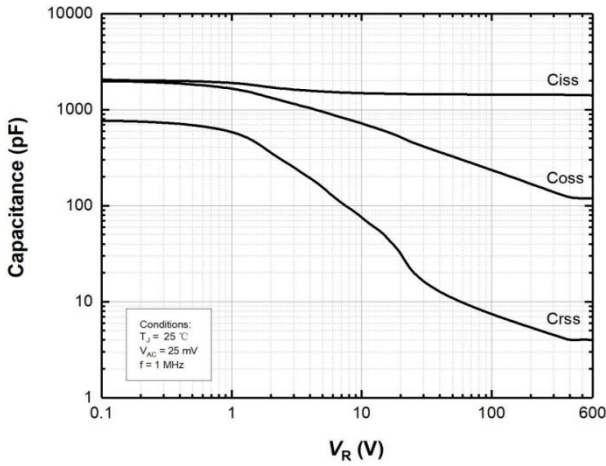


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

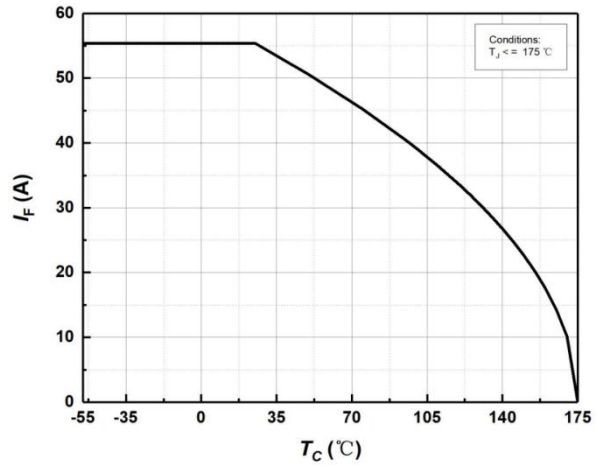


Figure 14. Continuous Drain Current Derating vs Case Temperature

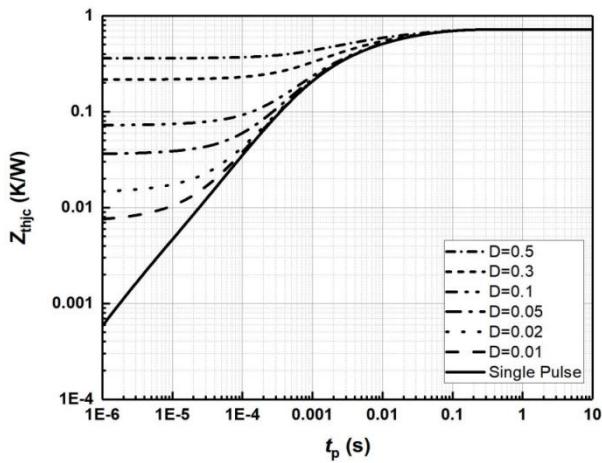


Figure 15. Transient Thermal Impedance (Junction – Case)

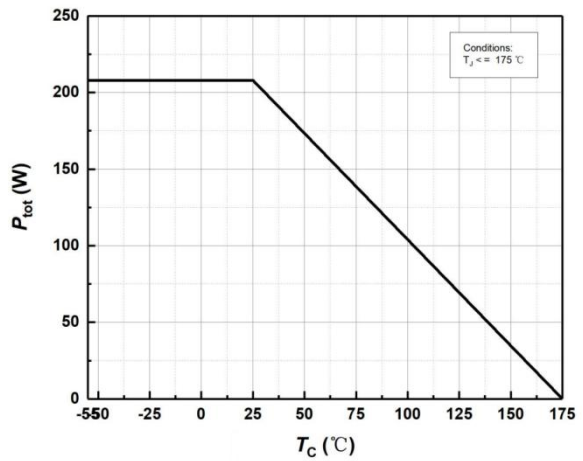


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

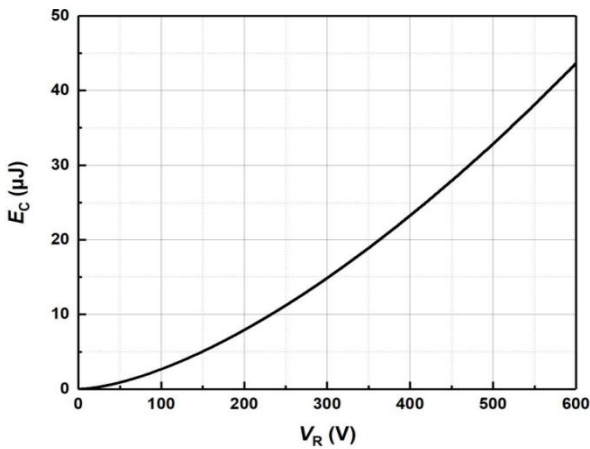


Figure 17. Output Capacitor Stored Energy

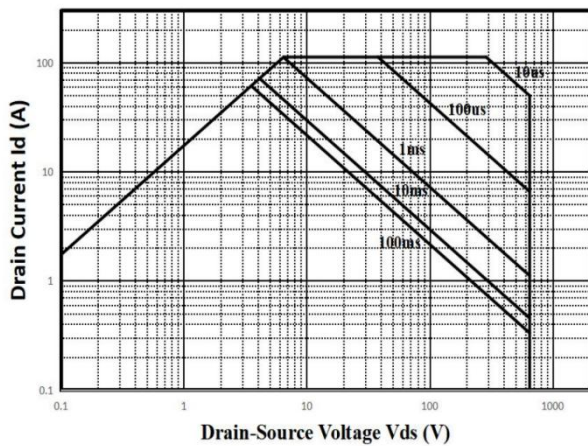
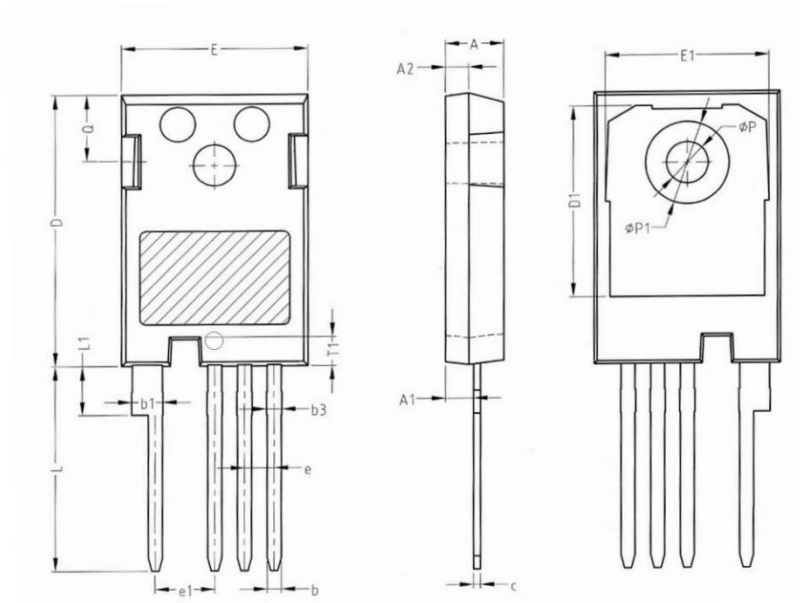


Figure 18. Safe Operating Area

TO-247-4 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.800	5.210	0.189	0.205
A1	2.210	2.610	0.087	0.103
A2	1.800	2.200	0.071	0.087
b	1.060	1.360	0.042	0.054
b1	2.330	2.940	0.092	0.116
b3	1.070	1.600	0.042	0.063
c	0.510	0.750	0.020	0.030
D	23.300	23.600	0.917	0.929
D1	16.250	17.650	0.640	0.695
E	15.740	16.140	0.620	0.635
E1	13.100	14.320	0.516	0.564
T1	2.350	2.650	0.093	0.104
e	2.540 BSC		0.100 BSC	
e1	5.080 BSC		0.200 BSC	
Q	5.490	6.090	0.216	0.240
L	17.270	17.870	0.680	0.704
L1	3.970	4.390	0.156	0.173
ΦP	3.400	3.800	0.134	0.150
ΦP1	7.190 REF		0.283 REF	