AS2M020065T

N-Channel Silicon Carbide Power MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D@25℃
650V	30mΩ@18V	92A

Feature

- High Blocking Voltage With Low On-Resistance
- High Speed Switching With Low Capacitance
- Easy to Parallel and Simple to Drive

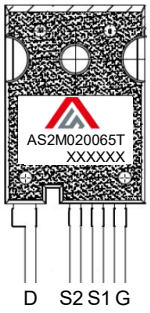
Application

- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Renewable Energy
- EV Battery Chargers

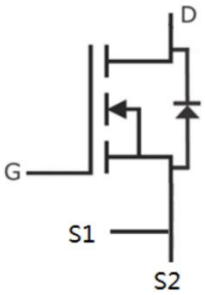
Package

TO-247-4

Marking



Circuit diagram



Absolute maximum ratings (T_C=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GSmax}	-8/+22	V
Recommend Gate-Source Voltage	V_{GSop}	-4/+18	V
Continuous Drain Current (T_C=25℃)	I_D	92	A
Continuous Drain Current (T_C=100℃)	I_D	64	A
Pulsed Drain Current	I_{DM}	257	A
Power Dissipation (T_C=25℃)	P_D	312	W
Thermal Resistance,Junction-to-Case(Typ.)	$R_{\theta JC}$	0.48	℃/W
Junction Temperature	T_J	175	℃
Storage Temperature	T_{STG}	-55~ +175	℃

Electrical characteristics (T_C=25℃, 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	100	μA
Gate-Source leakage current	I_{GSS+}	V_{GS} =22V, V_{DS} = 0V		10	250	nA
Gate-Source leakage current	I_{GSS-}	V_{GS} =-8V, V_{DS} = 0V		10	250	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =15mA	1.9	2.6	4	V
		V_{DS} =V_{GS}, I_D =15mA,T_j = 175℃		1.8		V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =18V, I_D =50A		20	30	mΩ
		V_{GS} =18V, I_D =50A,T_j = 175℃		28		mΩ
Dynamic characteristics[1)]						
Input Capacitance	C_{iss}	V_{DS} =600V,V_{GS} =0V,f =1MHz V_{AC}=25mV		3180		pF
Output Capacitance	C_{oss}			281		
Reverse Transfer Capacitance	C_{rss}			33		
Total Gate Charge	Q_g	V_{DS} =400V,V_{GS} =-4/18V, I_D =40A		187		nC
Gate-Source Charge	Q_{gs}			49		
Gate-Drain Charge	Q_{gd}			31		
Turn-on delay time	$t_{d(on)}$	V_{DS}=400V,V_{GS}=-4/18V, I_D =40A,$R_{G(ext)}$=2.5Ω,R_L=20Ω		17		nS
Turn-on rise time	t_r			15		
Turn-off delay time	$t_{d(off)}$			65		
Turn-off fall time	t_f			14		
Turn-On Energy	E_{on}	V_{DS}=400V,V_{GS}=-4/18V, I_D =40A,$R_{G(ext)}$=2.5Ω,L=100μH		0.52		mJ
Turn-Off Energy	E_{off}			0.7		
Source-Drain Diode characteristics						
Diode Forward Current	I_S				92	A
Diode Forward voltage	V_{SD}	V_{GS} =-4V, I_{SD}= 25A		4.2		V
		V_{GS} =-4V, I_{SD}= 25A,T_J=175℃		3.9		V
Reverse Recovery Time	t_{rr}	I_{SD}= 40A,V_R=400V		26		nS
Reverse Recovery Charge	Q_{rr}			58		nC
Peak Reverse Recovery Current	I_{rrm}			3.4		A

Notes:

1) Guaranteed by design, not subject to production.

Typical Characteristics

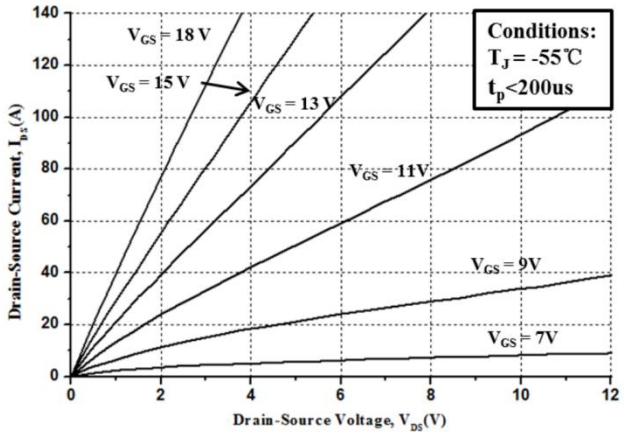


Figure 1. Output Characteristics T_J = -55℃

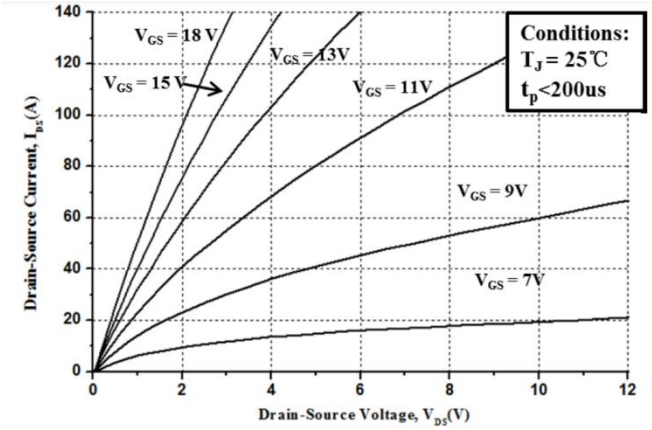


Figure 2. Output Characteristics T_J = 25℃

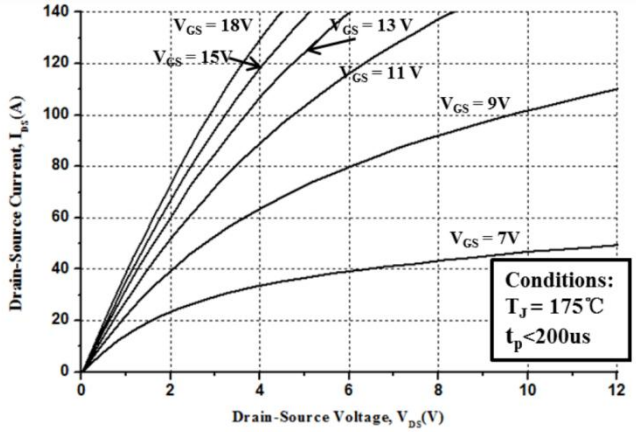


Figure 3. Output Characteristics T_J = 175℃

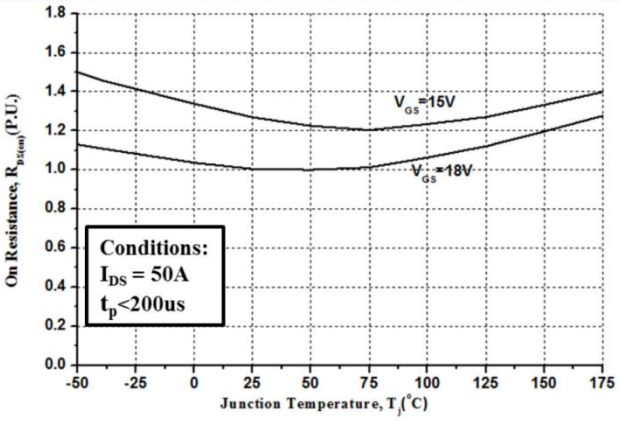


Figure 4. Normalized On-Resistance vs. Temperature

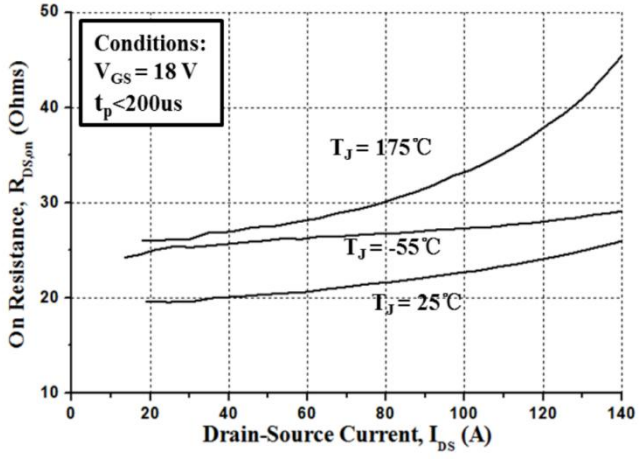


Figure 5. On-Resistance vs. Drain Current
For Various Temperatures

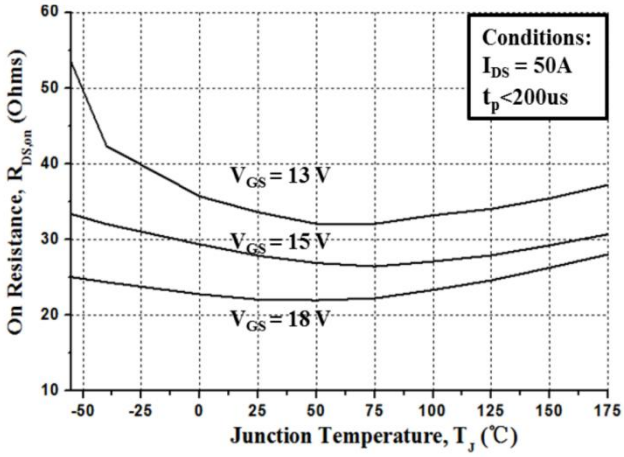


Figure 6. On-Resistance vs. Temperature
For Various Gate Voltage

Typical Characteristics

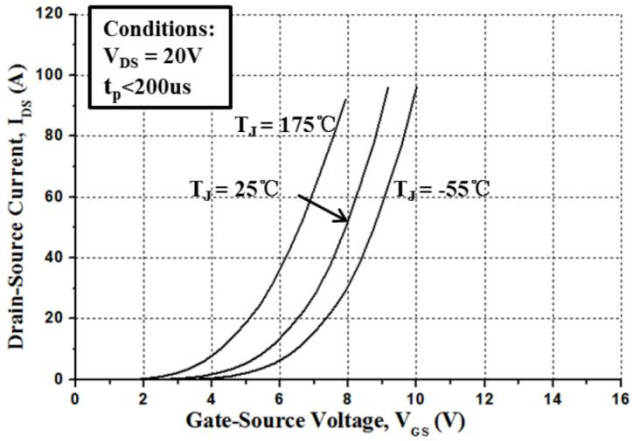


Figure 7. Transfer Characteristic for Various Junction Temperatures

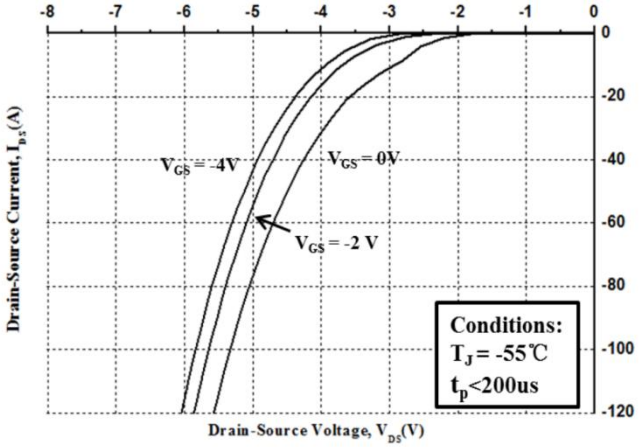


Figure 8. Body Diode Characteristic at -55℃

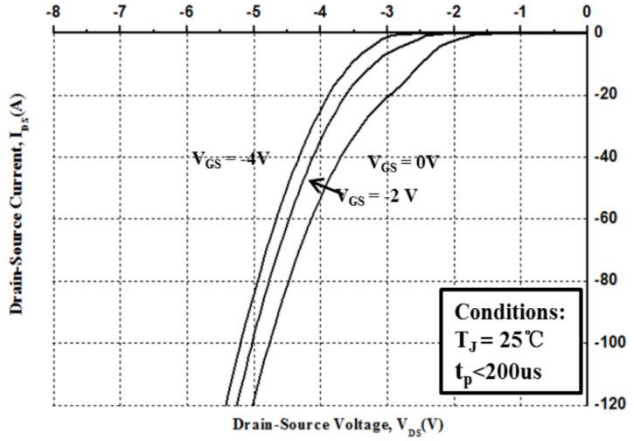


Figure 9. Body Diode Characteristic at 25℃

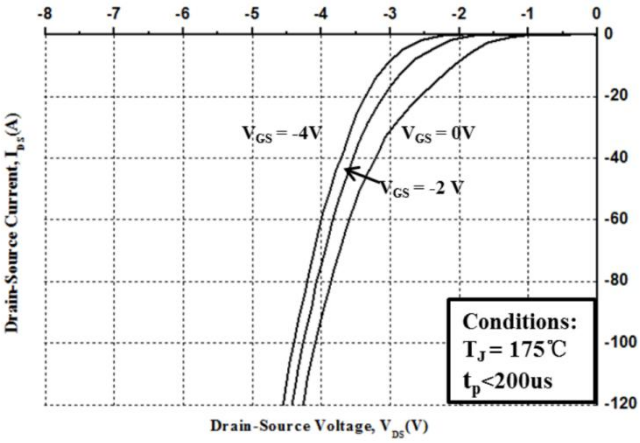


Figure 10. Body Diode Characteristic at 175℃

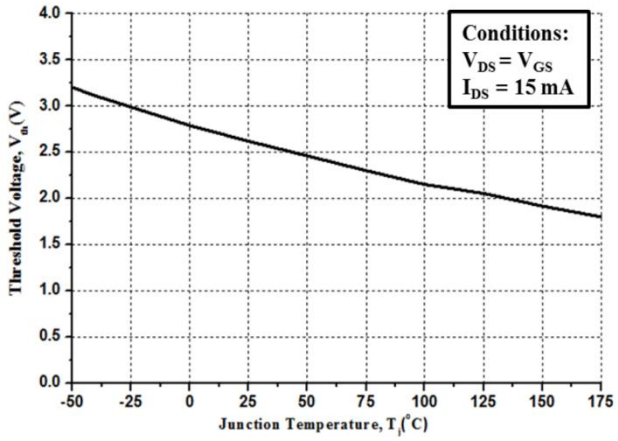


Figure 11. Threshold Voltage vs. Temperature

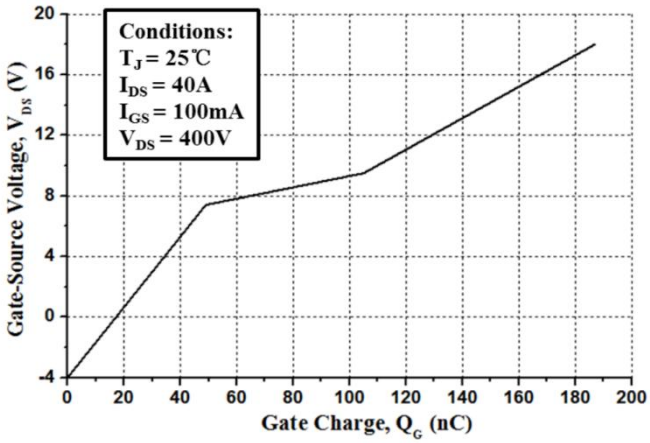


Figure 12. Gate Charge Characteristics

Typical Characteristics

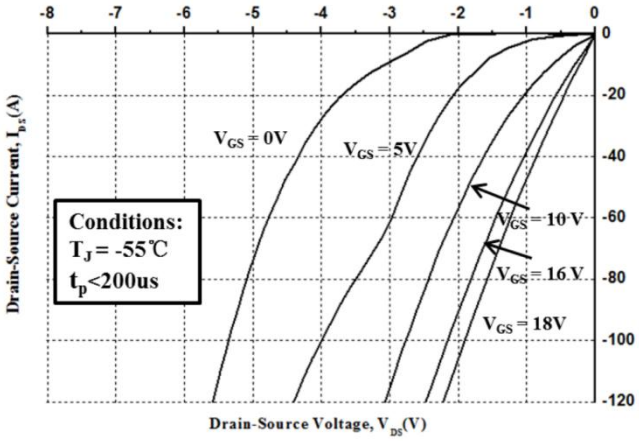


Figure 13. 3rd Quadrant Characteristic at -55℃

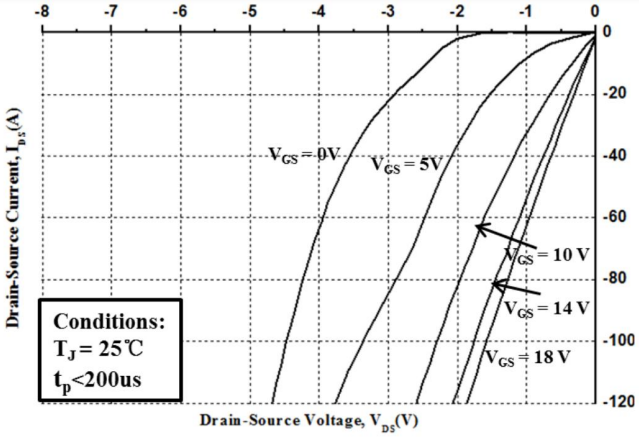


Figure 14. 3rd Quadrant Characteristic at 25℃

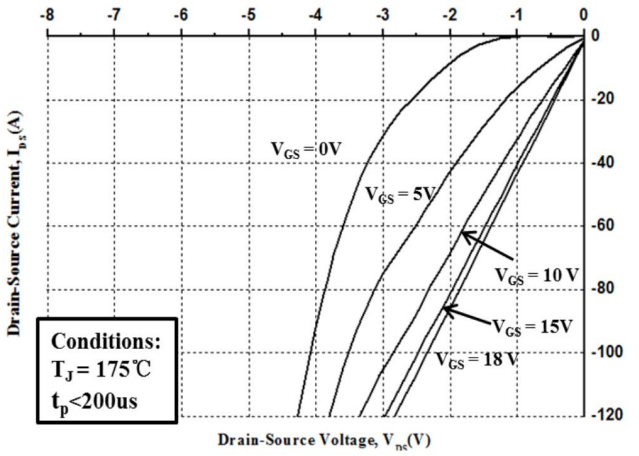


Figure 15. 3rd Quadrant Characteristic at 175 ℃

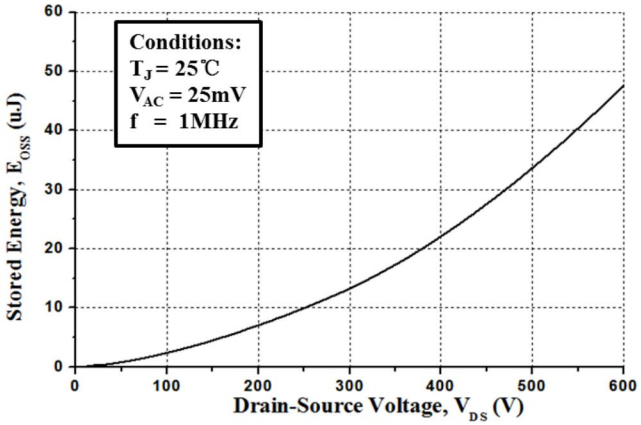


Figure16. Output Capacitor Stored Energy

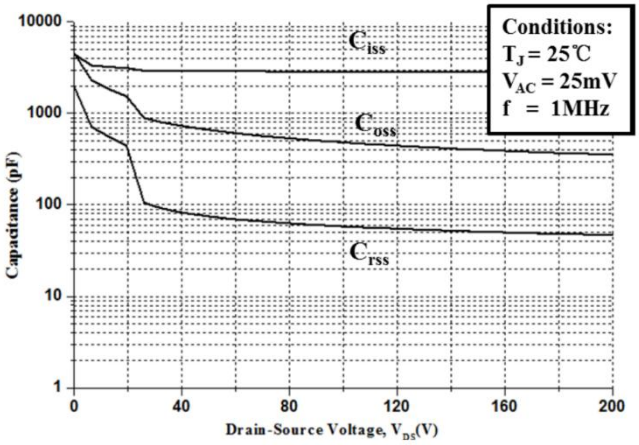


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

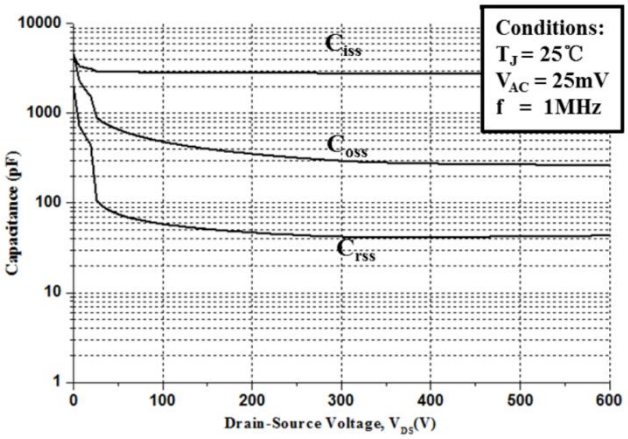


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 1000V)

Typical Characteristics

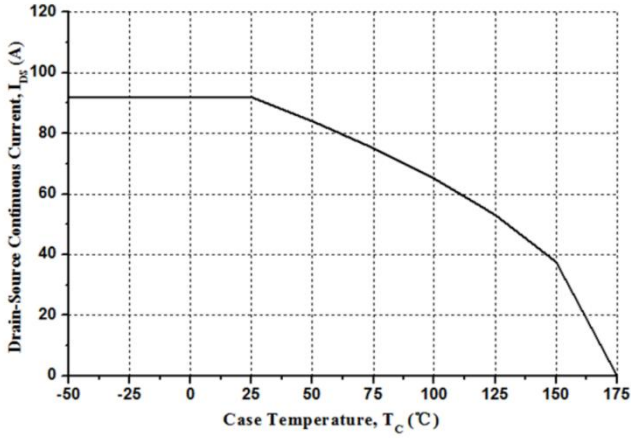


Figure 19. Continuous Drain Current Derating vs. Case Temperature

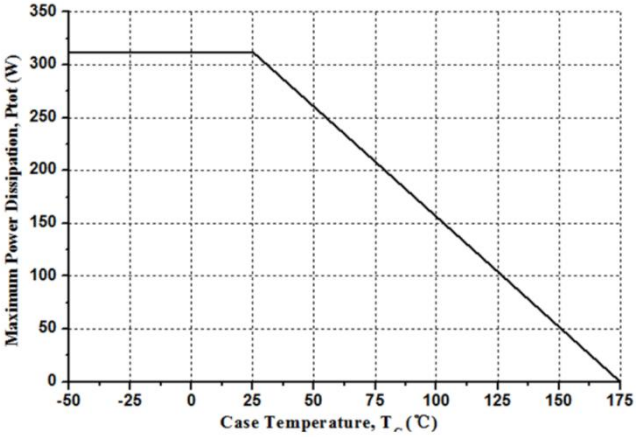


Figure 20. Maximum Power Dissipation Derating vs. Case Temperature

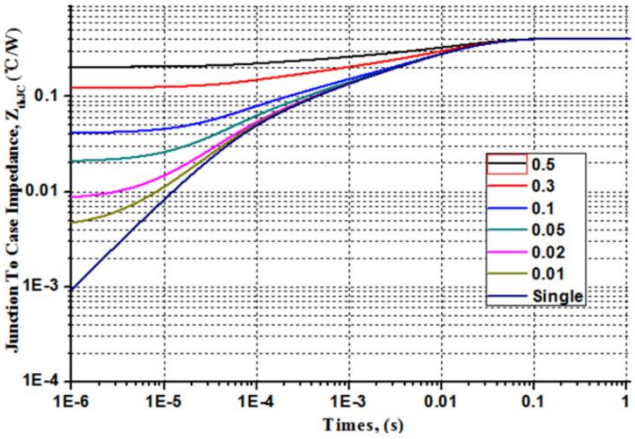


Figure 21. Transient Thermal Impedance (Junction - Case)

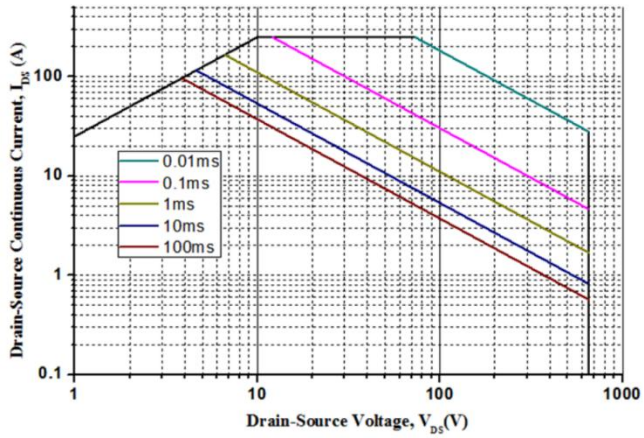
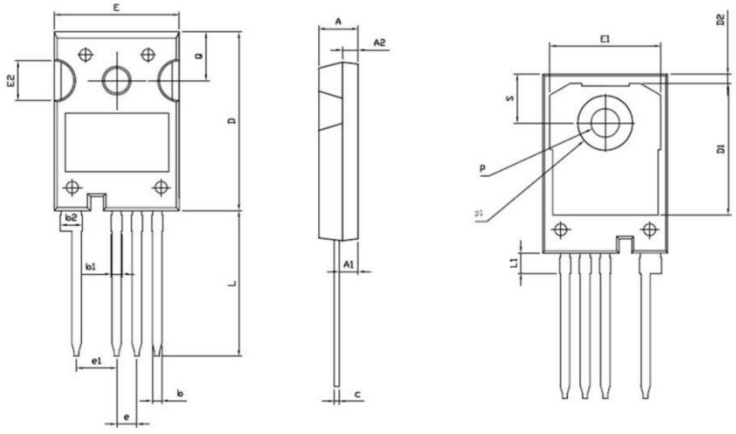


Figure22. Safe Operating Area

TO-247-4 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A2	1.850	2.150	0.073	0.085
b	1.050	1.350	0.041	0.053
b1	1.000	1.600	0.039	0.063
b2	2.350	2.950	0.093	0.116
c	0.500	0.700	0.020	0.028
D	22.340	22.740	0.880	0.895
D1	16.000	17.000	0.630	0.669
D2	0.970	1.370	0.038	0.054
e	2.340	2.740	0.092	0.108
e1	4.880	5.280	0.192	0.208
E	15.600	16.000	0.614	0.630
E1	13.500	14.500	0.531	0.571
E2	4.800	5.200	0.189	0.205
L	18.080	18.680	0.712	0.735
L1	2.380	2.780	0.094	0.109
P	3.500	3.700	0.138	0.146
p1	6.600	7.000	0.260	0.276
Q	6.000	6.300	0.236	0.248
S	6.000	6.300	0.236	0.248