

### Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_D@25^{\circ}C$
650V	38mΩ@18V	84A

### Feature

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

### Application

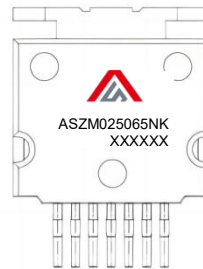
- Switch mode power supplies
- Renewable energy
- On Board Charger
- High voltage DC/DC converters

### Package

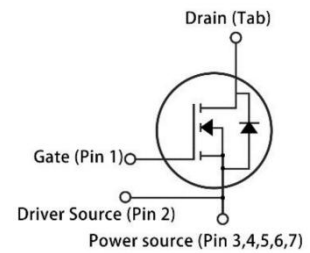


T2PAK

### 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 ( $f > 1$ Hz)	-10/+25	V
Recommend Gate-Source Voltage	$V_{GSop}$	Static	-4/+18	V
Continuous Drain Current	$I_D$	$V_{GS} = 18V, T_C = 25^{\circ}C$	84	A
	$I_D$	$V_{GS} = 18V, T_C = 100^{\circ}C$	59	A
Pulsed Drain Current	$I_{DM (pluse)}$	Pulse with $t_p$ limited by $T_{jmax}$	151	A
Power Dissipation	$P_D$	$T_C = 25^{\circ}C$	238	W
Thermal Resistance (Typ)	$R_{\theta JC}$	Junction-to-Case	0.63	$^{\circ}C/W$
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			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> = 16mA		3.0		V
		V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 16mA, T <sub>j</sub> = 175°C		2.0		
Drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 18V, I <sub>D</sub> = 40A		26	38	mΩ
		V <sub>GS</sub> = 18V, I <sub>D</sub> = 40A, T <sub>j</sub> = 175°C		35		
Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 18V, I <sub>D</sub> = 40A		27		S
		V <sub>DS</sub> = 18V, I <sub>D</sub> = 40A, T <sub>j</sub> = 175°C		25		
<b>Dynamic characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 600V, V <sub>GS</sub> = 0V, f = 1 MHz V <sub>AC</sub> = 25mV		2543		pF
Output Capacitance	C <sub>oss</sub>			173		
Reverse Transfer Capacitance	C <sub>rss</sub>			8		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 400V, I <sub>D</sub> = 40A V <sub>GS</sub> = -4V/18V		74.5		nC
Gate-Source Charge	Q <sub>gs</sub>			29		
Gate-Drain Charge	Q <sub>gd</sub>			35		
Internal Gate Resistance	R <sub>G(int)</sub>	f = 1MHz, V <sub>AC</sub> = 25mV		1.2		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		51		A
Diode pulse Current	I <sub>S, pulse</sub>	V <sub>GS</sub> = -4V, pulse width tp limited by T <sub>jmax</sub>		151		A
Diode Forward voltage	V <sub>SD</sub>	V <sub>GS</sub> = -4V, I <sub>SD</sub> = 20A		4.3		V
		V <sub>GS</sub> = -4V, I <sub>SD</sub> = 20A, T <sub>j</sub> = 175°C		3.7		

## Typical Characteristics

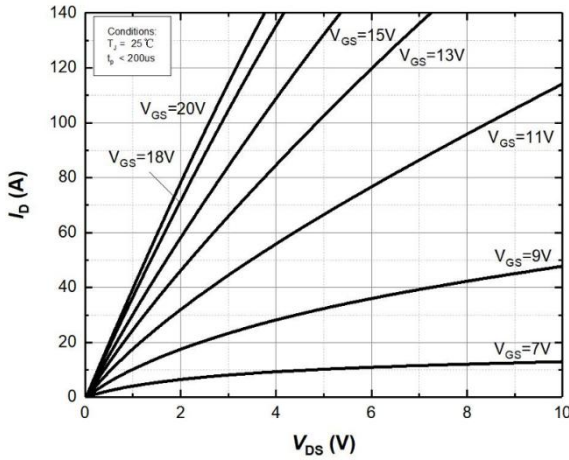


Figure 1. Output characteristics at  $T_j=25^\circ\text{C}$

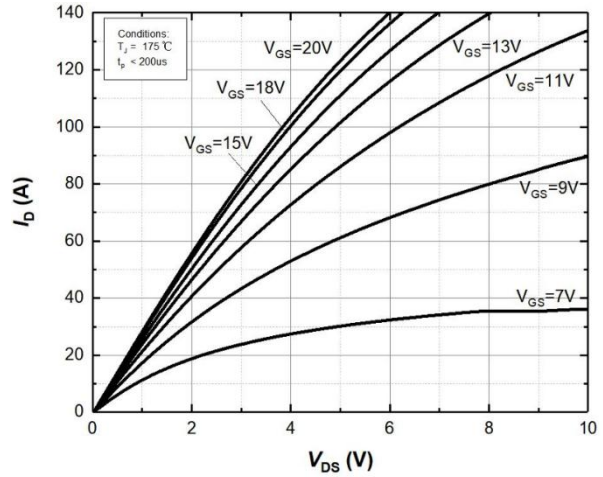


Figure 2. Output characteristics at  $T_j=175^\circ\text{C}$

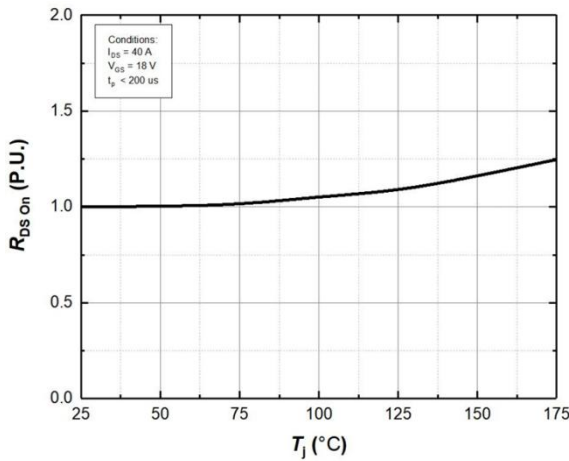


Figure 3. Normalized On-Resistance vs. Temperature

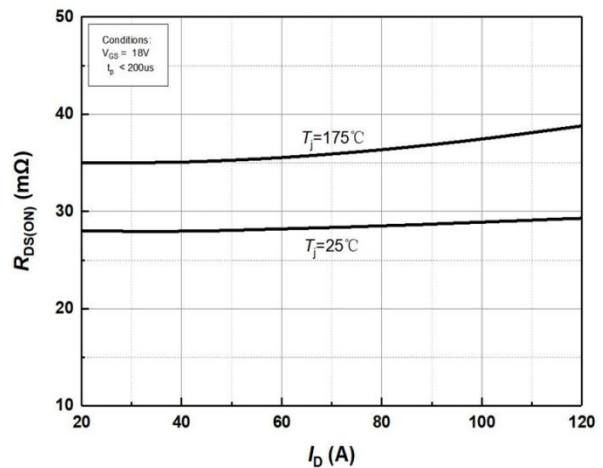


Figure 4. On-Resistance vs. Drain current for Various Temperature

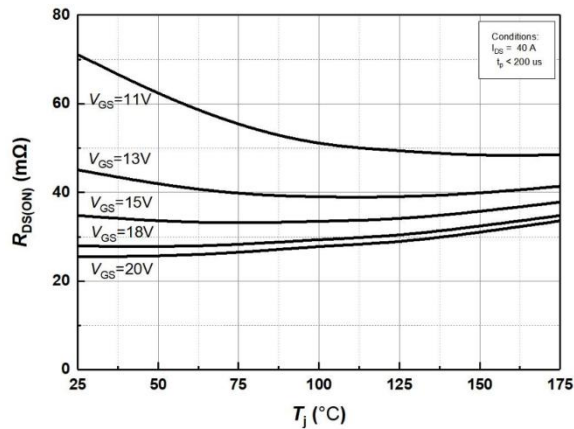


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

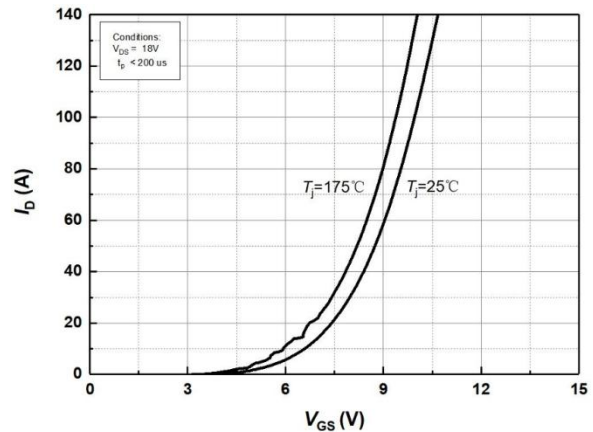


Figure 6. Transfer Characteristics for Various Junction Temperatures

## Typical Characteristics

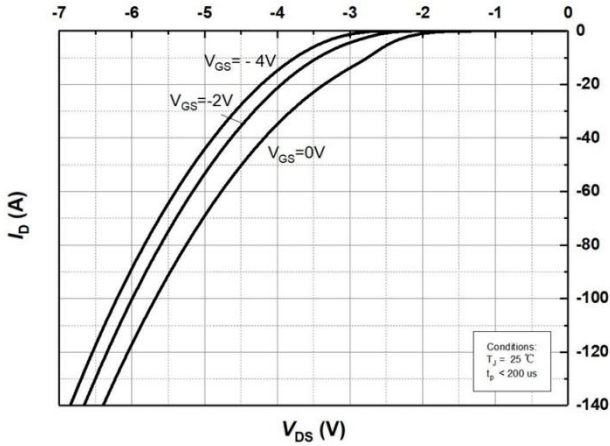


Figure 7. Body Diode Characteristics at Tj=25°C

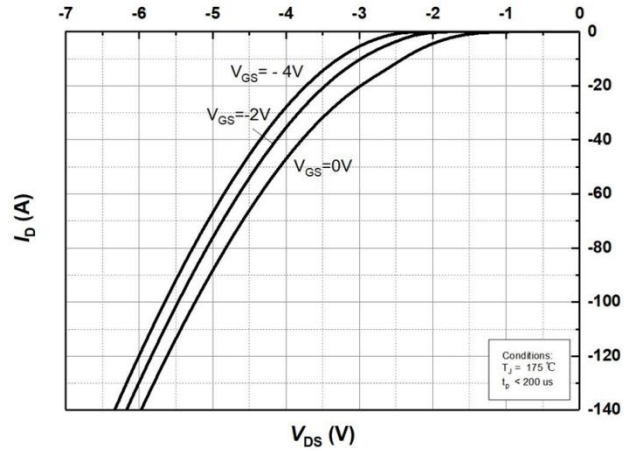


Figure 8. Body Diode Characteristics at Tj=175°C

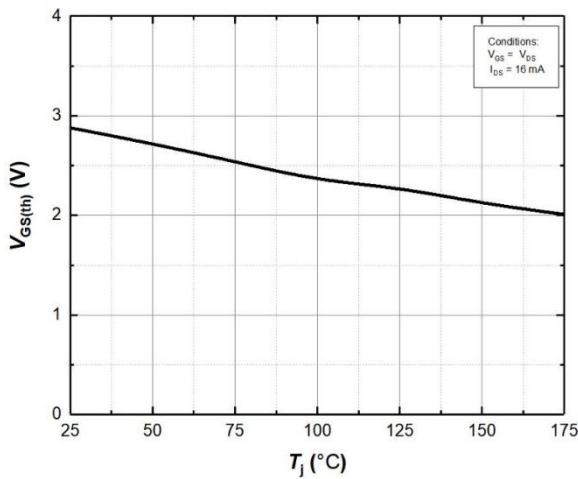


Figure 9. Threshold Voltage vs. Temperature

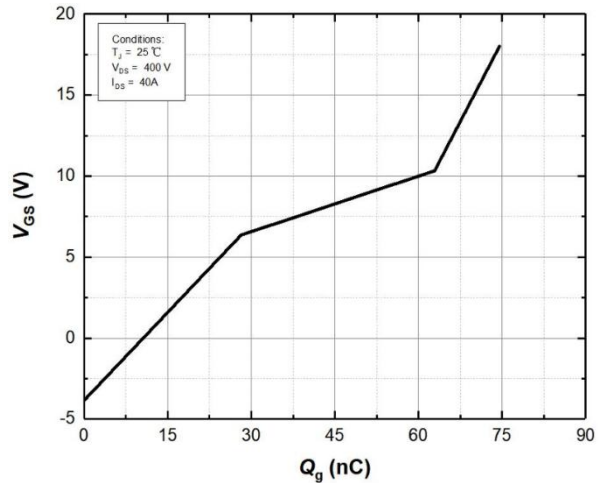


Figure 10 Gate Charge Characteristics

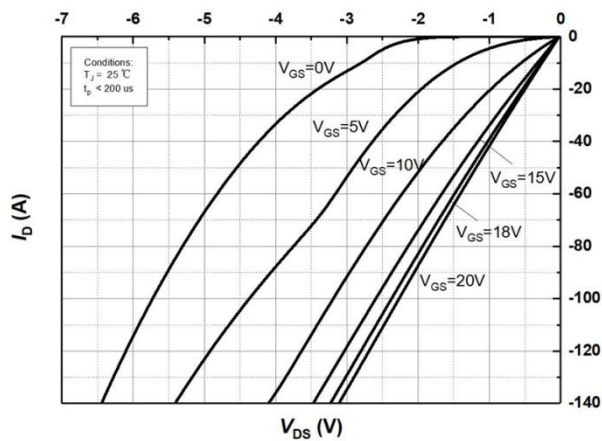


Figure 11. 3rd Quadrant Characteristic at Tj=25°C

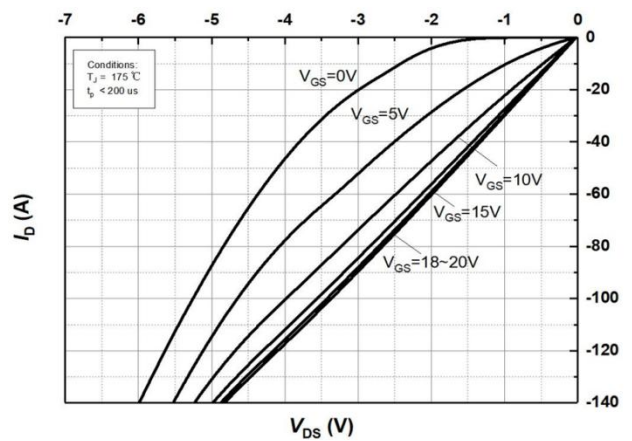


Figure 12. 3rd Quadrant Characteristic at Tj=175°C

## Typical Characteristics

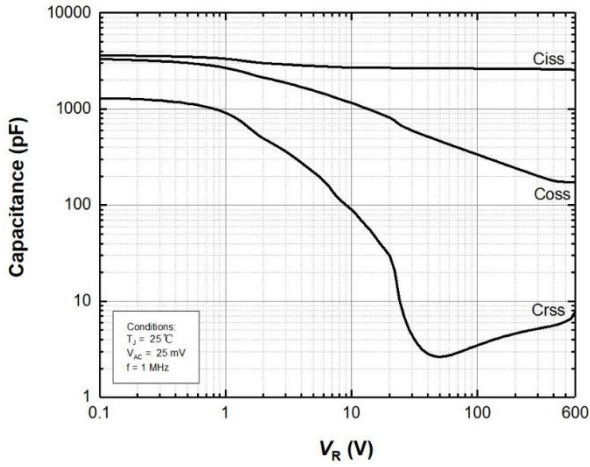


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

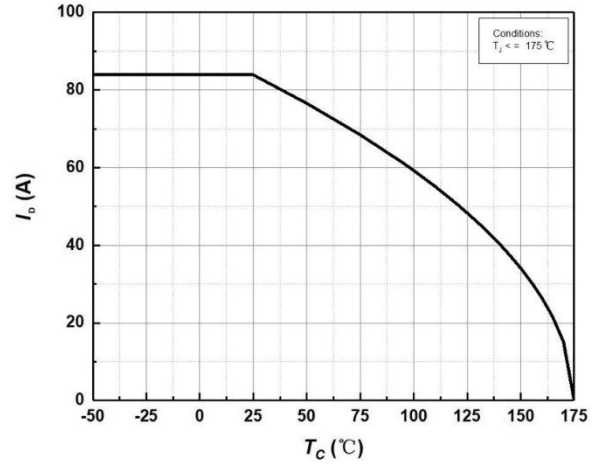


Figure 14. Continuous Drain Current Derating vs Case Temperature

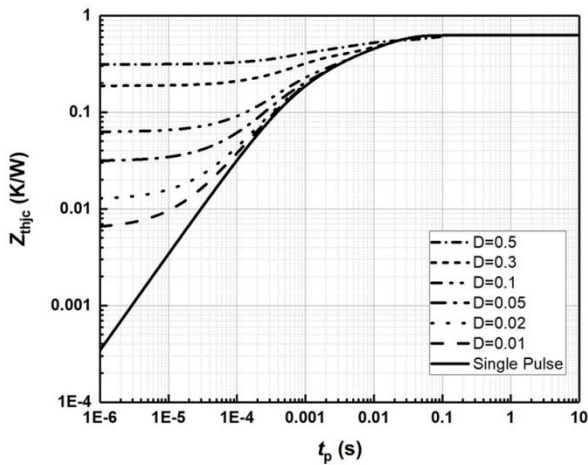


Figure 15. Transient Thermal Impedance (Junction – Case)

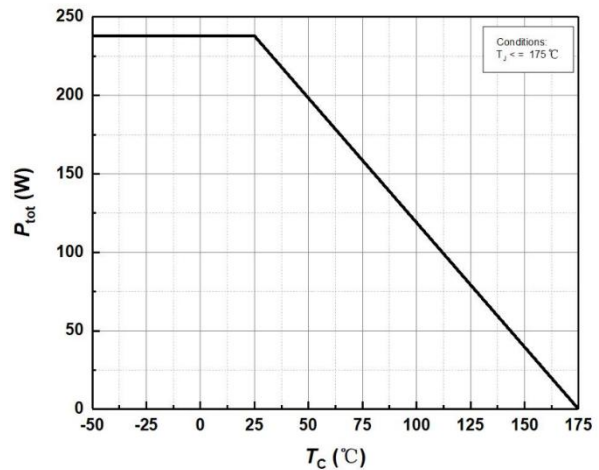


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

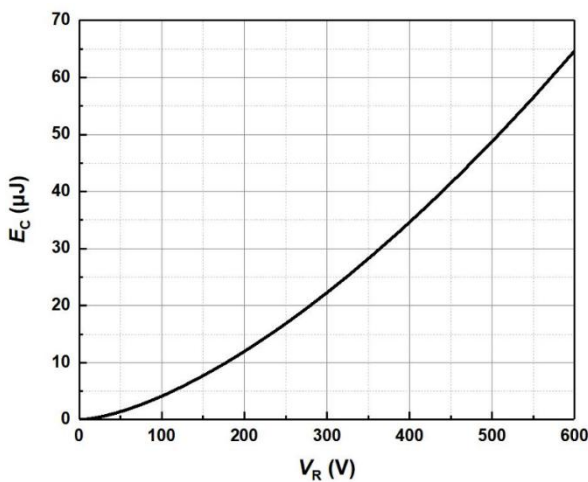


Figure 17. Output Capacitor Stored Energy

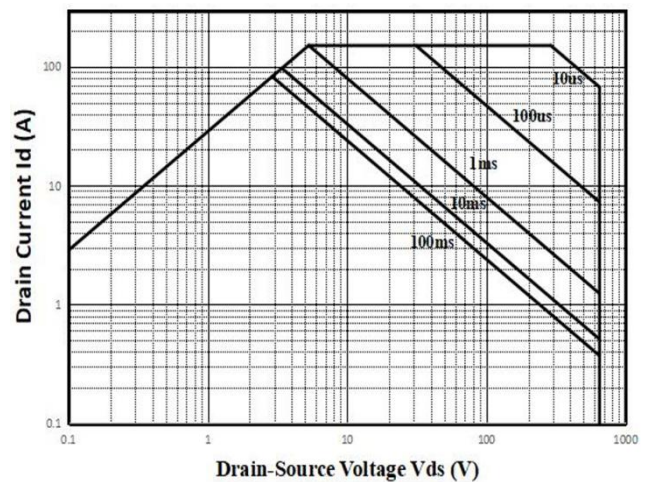
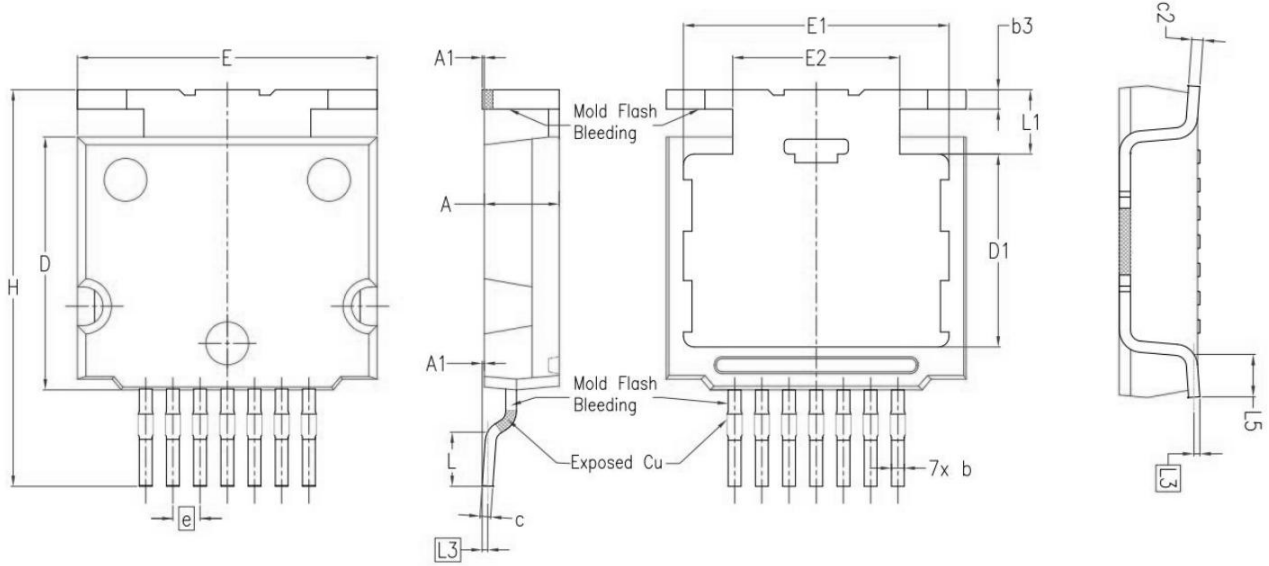


Figure 18. Safe Operating Area

### T2PAK Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	3.400	3.600	0.134	0.142
A1	0.000	0.250	0.000	0.010
b	0.500	0.700	0.020	0.028
b3	0.800	1.000	0.031	0.039
c	0.400	0.600	0.016	0.024
c2	0.400	0.600	0.016	0.024
D	11.700	11.900	0.461	0.469
D1	8.800	9.100	0.346	0.358
E	13.900	14.100	0.547	0.555
E1	12.300	12.500	0.484	0.492
E2	7.750	7.850	0.305	0.309
e	1.270 BSC		0.050 BSC	
H	18.000	19.000	0.709	0.748
L	2.300	2.750	0.091	0.108
L1	3.050 BSC		0.120 BSC	
L3	0.260 BSC		0.010 BSC	
L5	1.700	2.150	0.067	0.085