

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D@25^{\circ}C$
650V	40mΩ@18V	52A

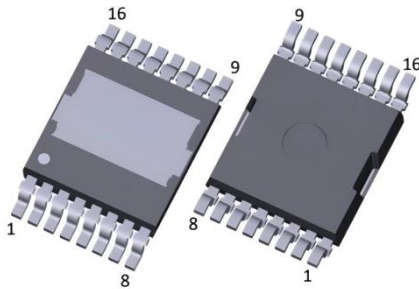
Feature

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

Application

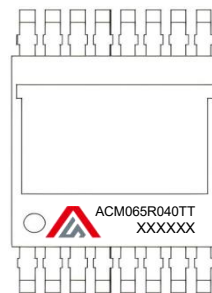
- Renewable Energy
- EV Battery Chargers
- High Voltage DC/DC Converters
- Switch Mode Power Supplies

Package

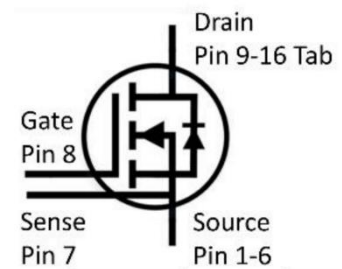


TOLT

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}	Absolute maximum values	-10/+23	V
Gate-Source Voltage	V_{GSOP}	Recommended operational values	-5/+18	V
Continuous Drain Current	I_D	$V_{GS}=18V, T_C=25^{\circ}C$	52	A
	I_D	$V_{GS}=18V, T_C=100^{\circ}C$	37	A
Pulsed Drain Current	$I_{D,pulse}$	Pulse with t_p limited by T_{jmax}	156	A
Power Dissipation	P_D	$T_J=175^{\circ}C$	166	W
Thermal Resistance (Typ)	$R_{\theta JC}$	Junction to Case	0.9	$^{\circ}C/W$
Operating Junction Temperature	T_J		-55~ +175	$^{\circ}C$
Storage Temperature	T_{STG}		-55~ +175	$^{\circ}C$

Electrical characteristics (T_c=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 =1mA	650			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =650V, V _{GS} =0V			100	μA
Gate-Source leakage current	I _{GSS+}	V _{DS} =0V, V _{GS} =23V			100	nA
	I _{GSS-}	V _{DS} =0V, V _{GS} =-10V				
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =7.5mA	2	2.9	4	V
		V _{DS} =V _{GS} , I _D =7.5mA, T _J =175℃		2.1		
Drain-source on-resistance	R _{DS(on)}	V _{GS} =18V, I _D =17.6A		40	52	mΩ
		V _{GS} =18V, I _D =17.6A, T _J =175℃		48		
Transconductance	g _{fs}	V _{GS} =20V, I _D =17.6A		22		S
		V _{GS} =20V, I _D =17.6A, T _J =175℃		20		
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} =400V, V _{GS} =0V, V _{AC} =25mV f =1MHz		1305		pF
Output Capacitance	C _{oss}			109		
Reverse Transfer Capacitance	C _{rss}			4.9		
C _{oss} Stored Energy	E _{oss}			9		
Internal Gate Resistance	R _{G(int)}	f =1MHz		1.4		Ω
Total Gate Charge	Q _g	V _{DS} =400V, V _{GS} =-5/18V I _D =17.6A		40		nC
Gate-Source Charge	Q _{gs}			14		
Gate-Drain Charge	Q _{gd}			12		
Turn-on delay time	t _{d(on)}	V _{DS} =400V, V _{GS} =-5V/+18V I _D =17.6A, R _{G(ext)} =2.5Ω R _L =25Ω		7		nS
Turn-on rise time	t _r			9		
Turn-off delay time	t _{d(off)}			17		
Turn-off fall time	t _f			6		
Turn-on Switching Energy	E _{on}	V _{DS} =400V, V _{GS} =-5V/+18V I _D =17.6A, R _{G(ext)} =2.5Ω L =100μH		133		μJ
Turn-off Switching Energy	E _{off}			44		
Source-Drain Diode characteristics						
Diode Forward Current	I _S	T _C =25℃			51	A
Diode Forward voltage	V _{SD}	V _{GS} =-5V, I _{SD} =8.8A		3.9		V
		V _{GS} =-5V, I _{SD} =8.8A, T _J =175℃		3.6		
Reverse Recovery Time	T _{rr}	V _R =400V, I _{SD} =8.8A		13		nS
Reverse Recovery Charge	Q _{rr}			98		nC
Peak Reverse Recovery Current	I _{rrm}			5		A

Typical Characteristics

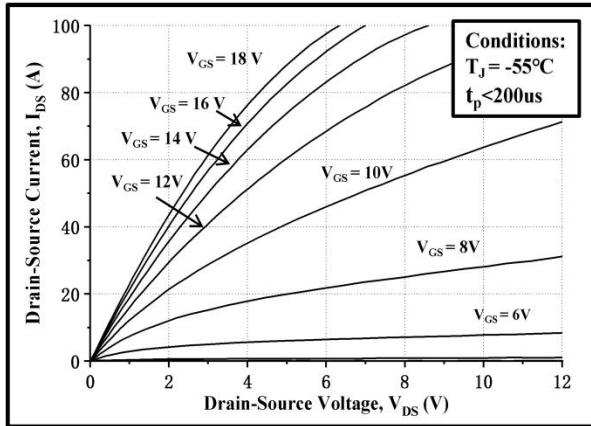


Figure 1. Output Characteristics $T_j = -55^\circ\text{C}$

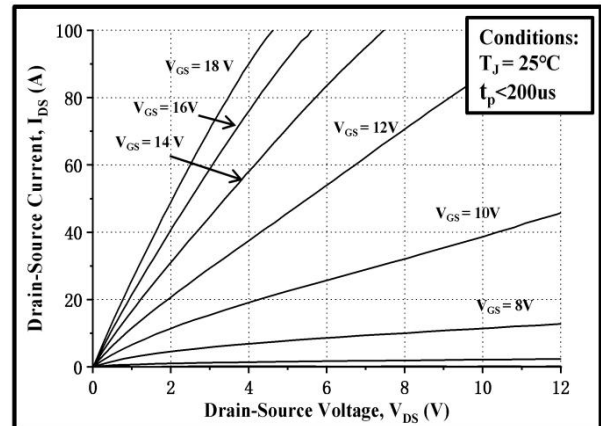


Figure 2. Output Characteristics $T_j = 25^\circ\text{C}$

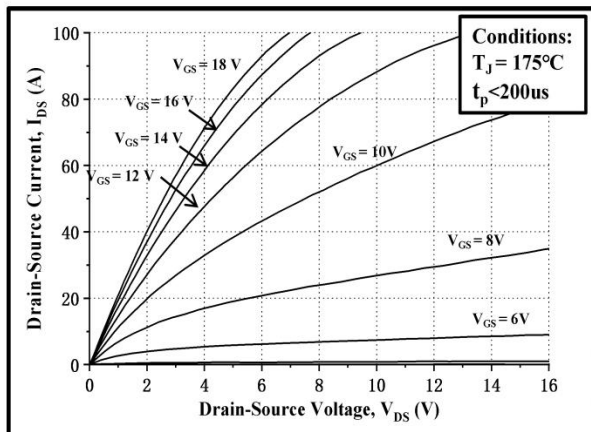


Figure 3. Output Characteristics $T_j = 175^\circ\text{C}$

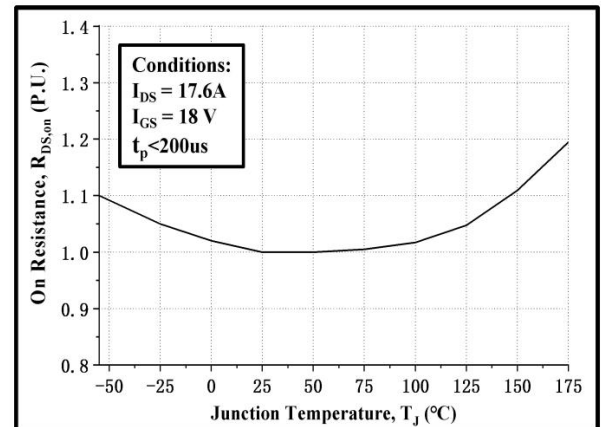


Figure 4. Normalized On-Resistance vs. Temperature

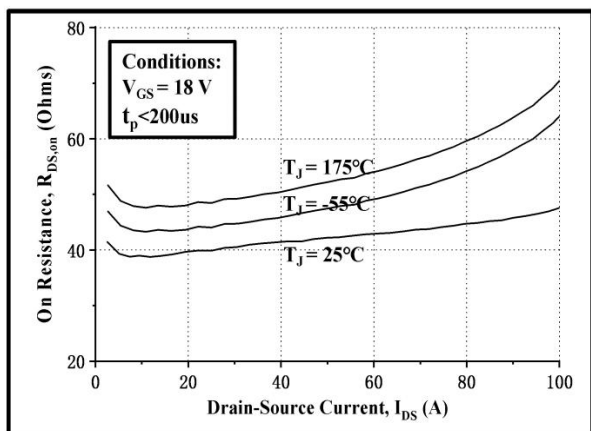


Figure 5. On-Resistance vs. Drain Current
For Various Temperatures

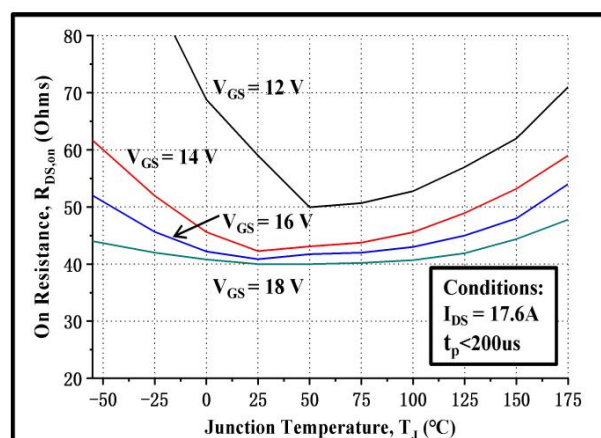


Figure 6. On-Resistance vs. Temperature
For Various Gate Voltage

Typical Characteristics

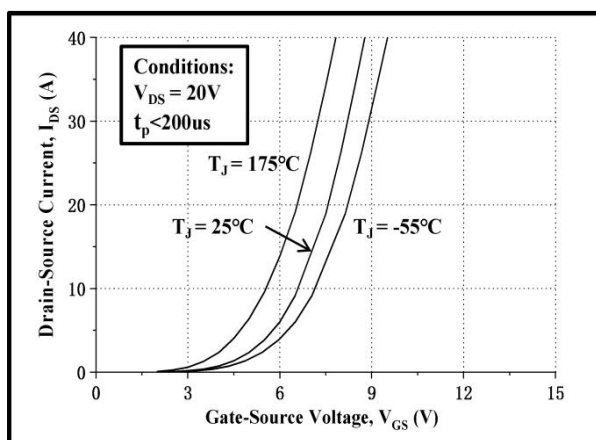


Figure 7. Transfer Characteristic for Various Junction Temperatures

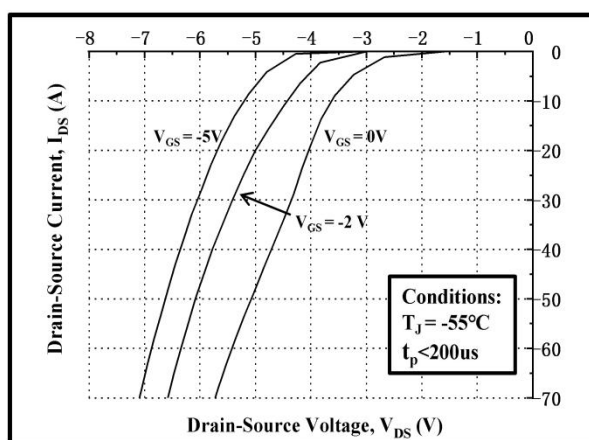


Figure 8. Body Diode Characteristic at -55°C

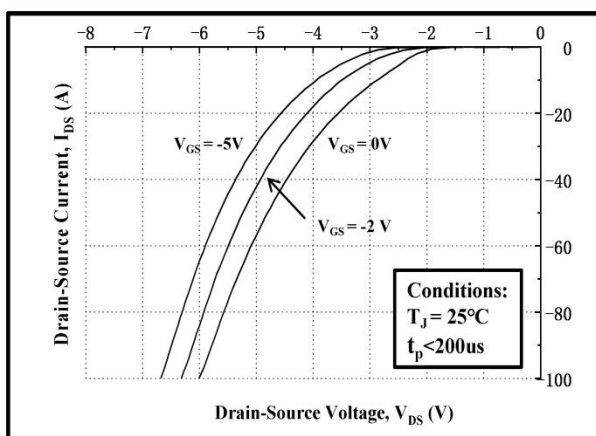


Figure 9. Body Diode Characteristic at 25°C

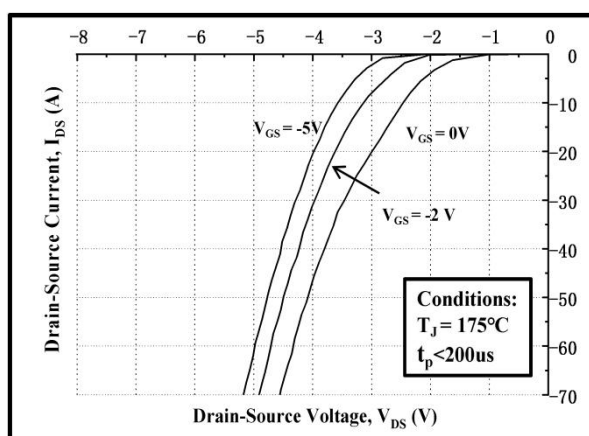


Figure 10. Body Diode Characteristic at 175°C

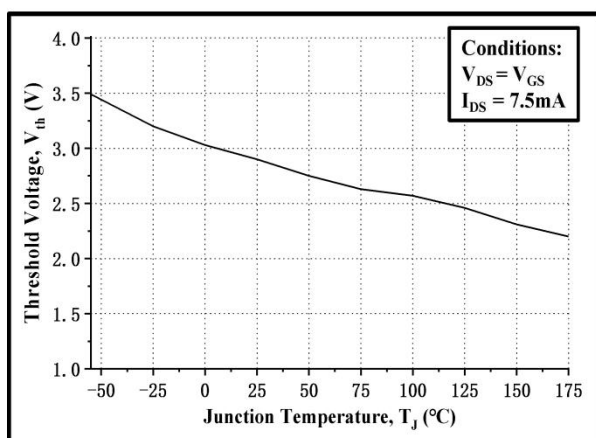


Figure 11. Threshold Voltage vs. Temperature

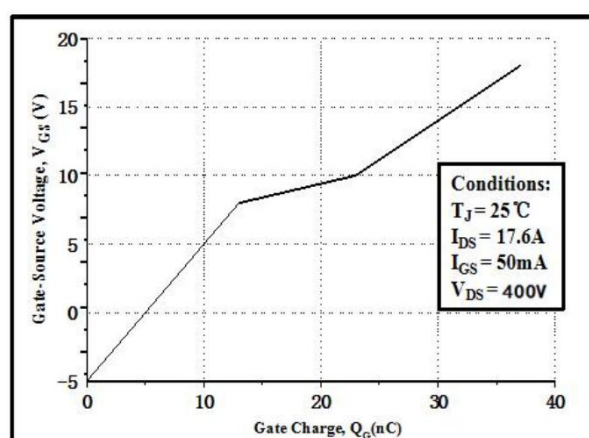


Figure 12. Gate Charge Characteristics

Typical Characteristics

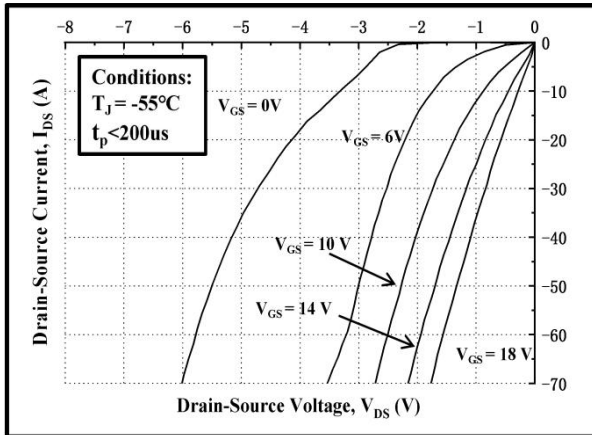


Figure 13. 3rd Quadrant Characteristic at -55°C

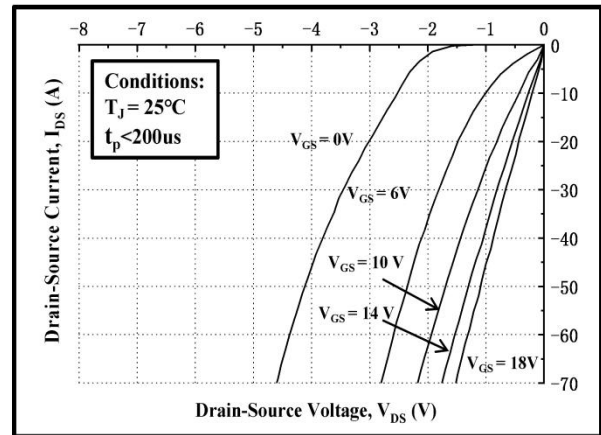


Figure 14. 3rd Quadrant Characteristic at 25°C

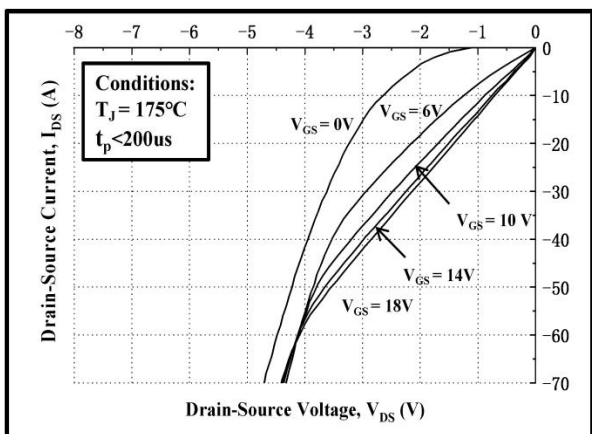


Figure 15. 3rd Quadrant Characteristic at 175 °C

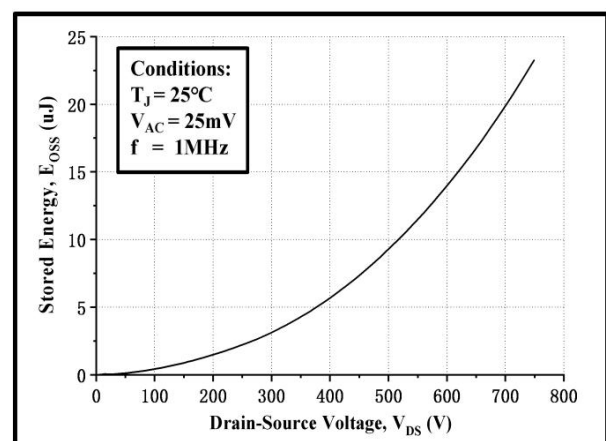


Figure16. Output Capacitor Stored Energy

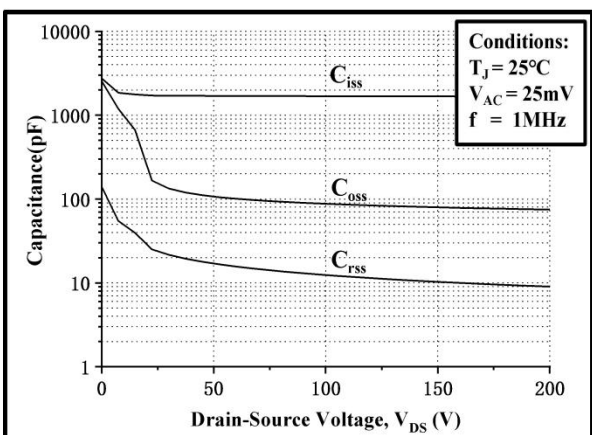


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

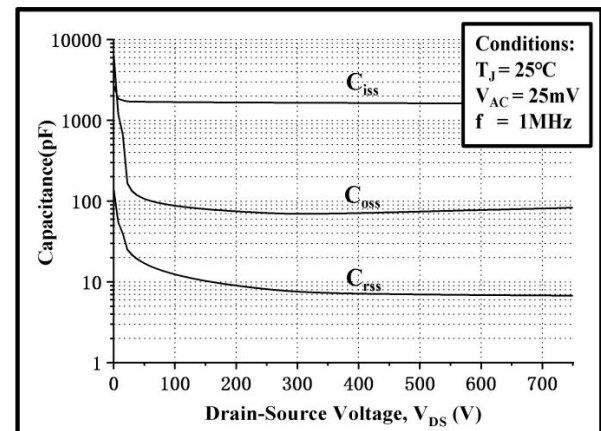


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 750V)

Typical Characteristics

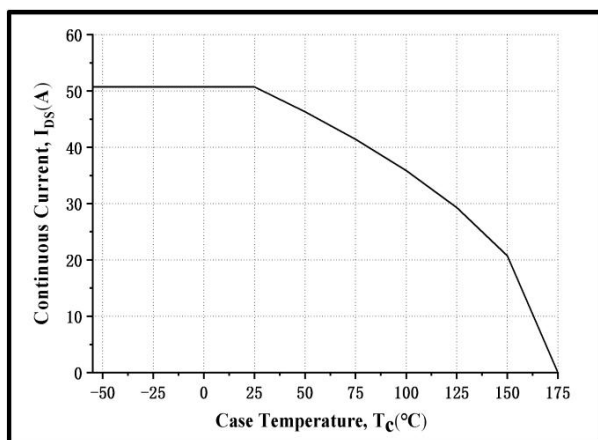


Figure 19. Continuous Drain Current Derating vs. Case Temperature

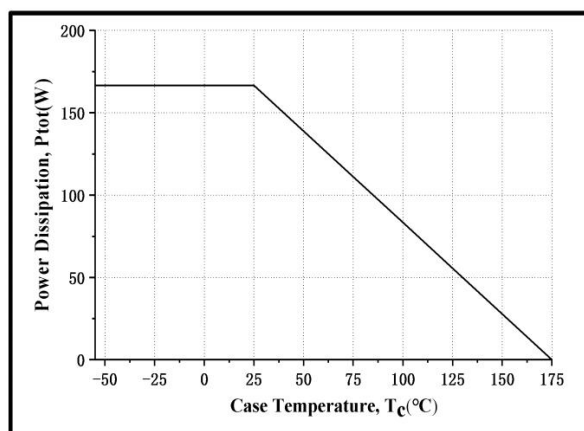


Figure 20. Maximum Power Dissipation Derating vs. Case Temperature

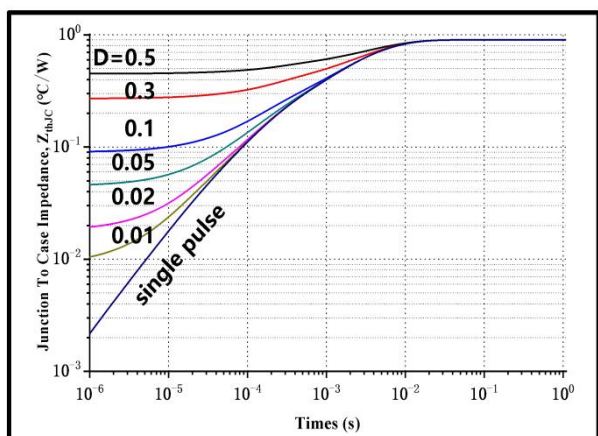


Figure 21. Transient Thermal Impedance (Junction - Case)

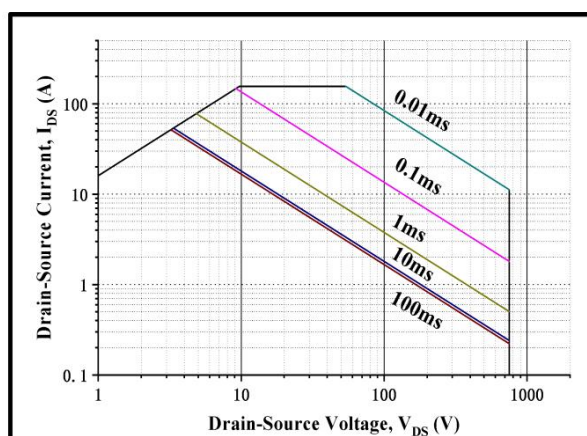
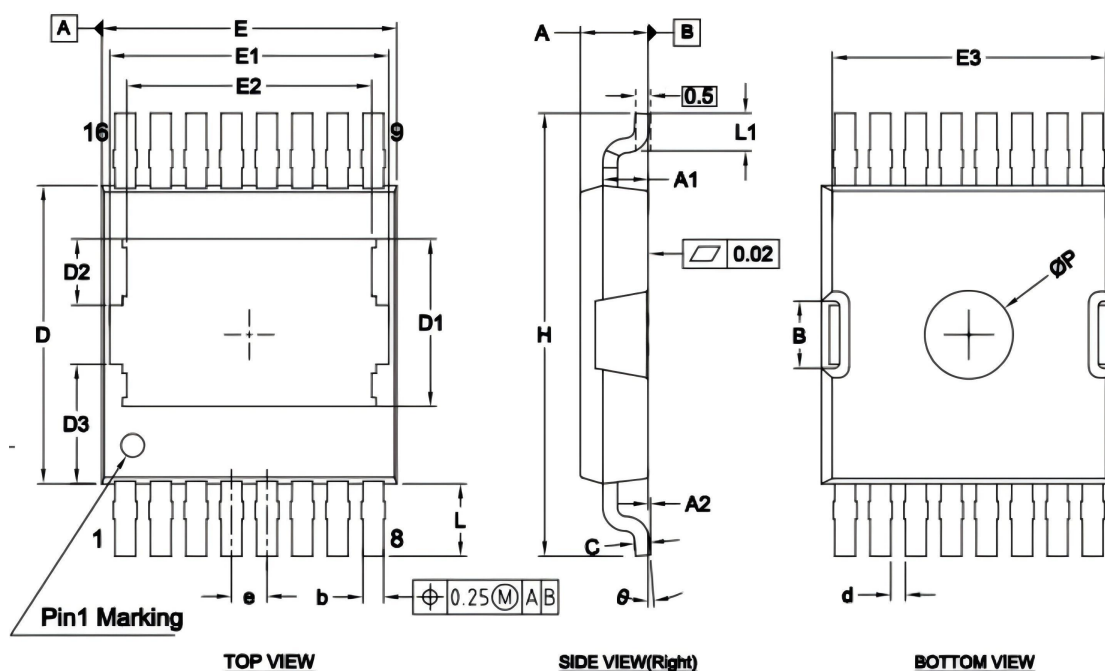


Figure 22. Safe Operating Area

TOLT Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.250	2.350	0.089	0.093
A1	1.440	1.640	0.057	0.065
A2	0.010	0.160	0.000	0.006
b	0.600	0.800	0.024	0.031
c	0.400	0.600	0.016	0.024
d	0.400	0.600	0.016	0.024
e	1.200 BSC.		0.047 BSC.	
D	10.000	10.300	0.394	0.406
D1	5.470	5.870	0.215	0.231
D2	2.040	2.440	0.080	0.096
D3	4.050 REF.		0.159 REF.	
E	9.700	10.300	0.382	0.406
E1	9.480 REF.		0.373 REF.	
E2	8.100	8.500	0.319	0.335
E3	9.070	9.470	0.357	0.373
H	14.800	15.200	0.583	0.598
L	2.250	2.650	0.089	0.104
L1	1.350	1.650	0.053	0.065
φ P	2.650	3.150	0.104	0.124
B	2.060	2.460	0.081	0.097
θ	1°	5°	1°	5°