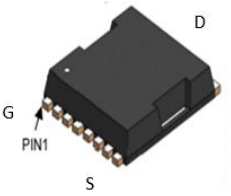
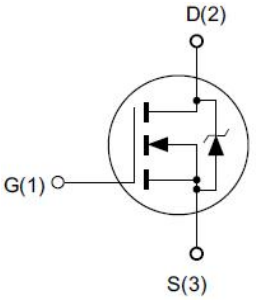
MSE003L

N-Channel Enhancement Mode MOSFET

Features

- ◆ 150V, 263A, $R_{DS(on)}$(Typ.) = 3.3mΩ@V_{GS} = 10V
- ◆ Excellent $R_{DS(on)}$ and Low Gate Charge
- ◆ Advanced Trench Technology
- ◆ 100% E_{AS} Guaranteed





Application

- ◆ Motor Driving in Power Tool, E-vehicle, Robotics
- ◆ Current Switching in DC/DC & AC/DC (SR) Sub systems
- ◆ Power Management in Telecom., Industrial Automation, CE

Absolute Maximum Ratings T_c = 25°C unless otherwise noted

Symbol	Parameter		Rating	Unit
V_{DS}	Drain-Source Voltage [a]		150	V
V_{GS}	Gate-Source Voltage		±20	
I_D	Drain Current-Continuous	T_C = 25°C	263	A
		T_C = 100°C	166	
I_{DM}	Drain Current-Pulsed [b]		1052	
P_D	Maximum Power Dissipation, T_C = 25°C		625	W
E_{AS}	Single Pulsed Avalanche Energy [c]		1106	mJ
T_J, T_{STG}	Operating and Store Temperature Range		150, -55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.2	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	42	

Electrical Characteristics T_J = 25°C unless otherwise noted

■ Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	150	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 150V, V_{GS} = 0V	-	-	1.0	μA
I_{GSS}	Forward Gate Body Leakage Current	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance [d]	V_{GS} = 10V, I_D = 20A	-	3.3	3.9	mΩ

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
R_G	Gate Resistance	V_{DS} = V_{GS} = 0V, f = 1.0MHz	-	4.1	-	Ω
C_{iss}	Input Capacitance	V_{DS} = 75V, V_{GS} = 0V, f = 1.0MHz	-	8622	-	pF
C_{oss}	Output Capacitance		-	722	-	
C_{rss}	Reverse Transfer Capacitance		-	26	-	

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	V_{DS} = 75V, V_{GS} = 10V, R_L = 3.75Ω, R_{GEN} = 3.0Ω	-	32	-	ns
t_r	Turn-On Rise Time		-	60	-	
$t_{d(off)}$	Turn-Off Delay Time		-	87	-	
t_f	Turn-Off Fall Time		-	48	-	
Q_g	Total Gate Charge	V_{DS} = 75V, V_{GS} = 0 to 10V, I_D = 20A	-	125	-	nC
Q_{gs}	Gate-Source Charge		-	46	-	
Q_{gd}	Gate-Drain Charge		-	32	-	

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_S	Drain-Source Diode Forward Continuous Current	V_G = V_D = 0V, Force Current	-	-	263	A
I_{SM}	Maximum Pulsed Current		-	-	1052	
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0V, I_S = 30A	-	0.7	1.2	V
T_{rr}	Body Diode Reverse Recovery Time	I_F = 15A, dI_F/dt = 100A/μs	-	111	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F = 15A, dI_F/dt = 100A/μs	-	428	-	nC

Notes:

a. T_J = +25 ℃ to +150 ℃.

b. Repetitive rating: pulse width limited by maximum junction temperature.

c. L = 0.5mH, V_{DD} = 25V, I_{AS} = 66.5A, R_G = 25Ω Starting T_J = 25 ℃.

d. Pulse width ≦ 300μs; duty cycle ≦ 2%.

■ Characteristic Curve

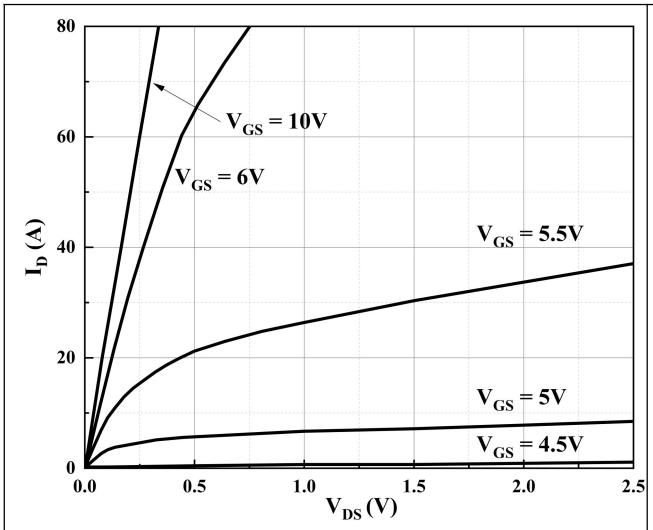


Figure 1. Typical Output Characteristics

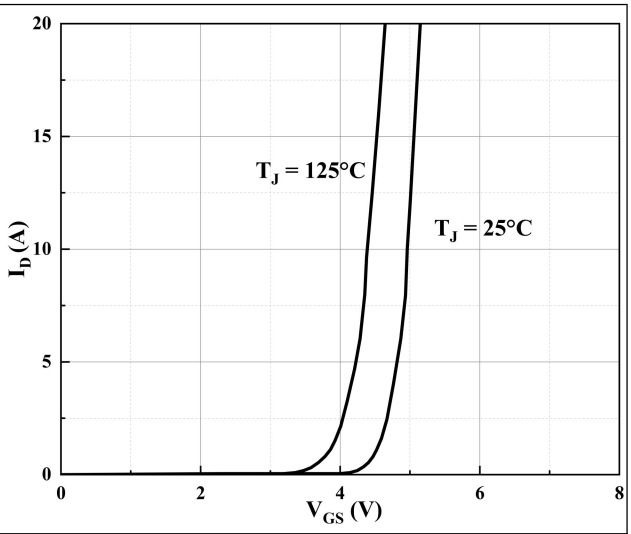


Figure 2. Typical Transfer Characteristics

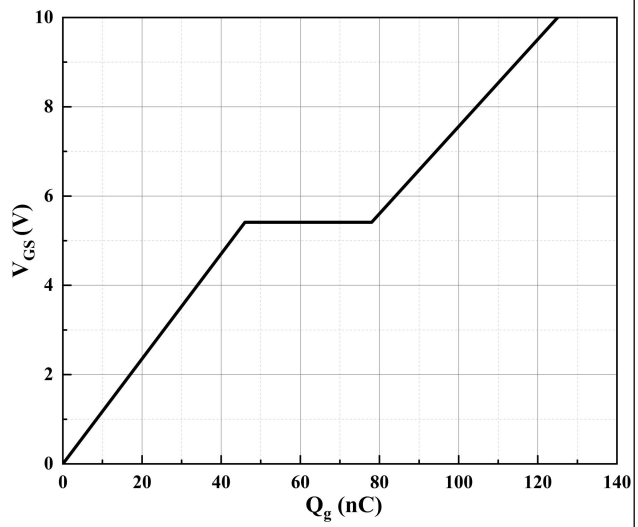


Figure 3. Typical Gate Charge

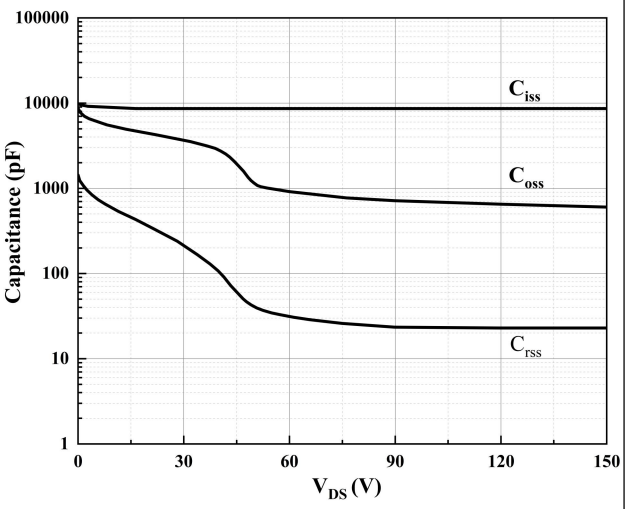


Figure 4. Typical Capacitance

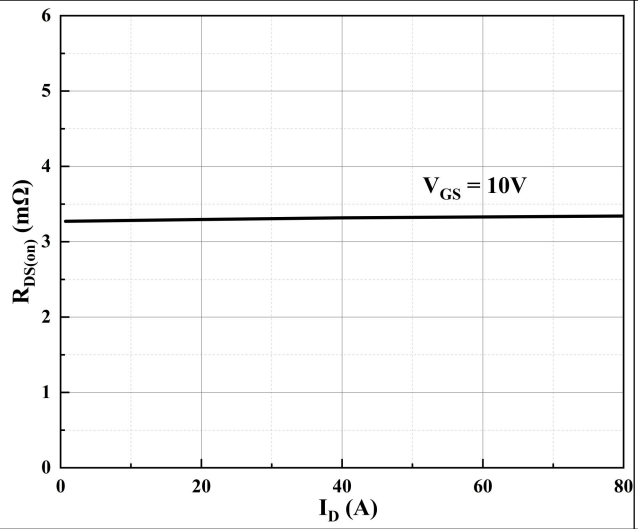


Figure 5. Static Drain-Source On-Resistance vs. Drain Current

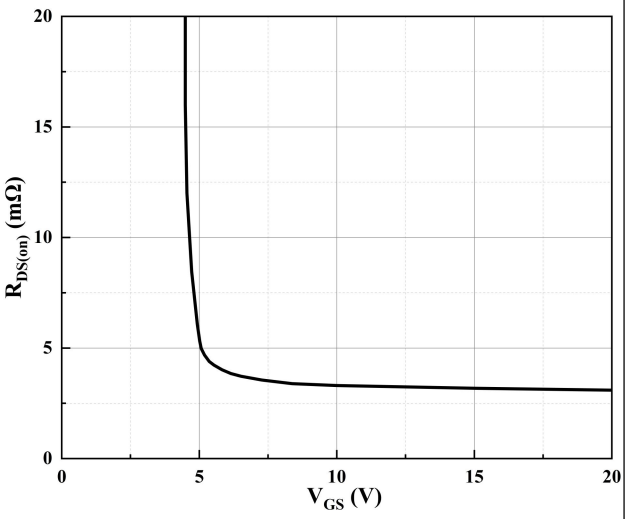


Figure 6. Static Drain-Source On-Resistance vs. Gate-Source Voltage

■ Characteristic Curve

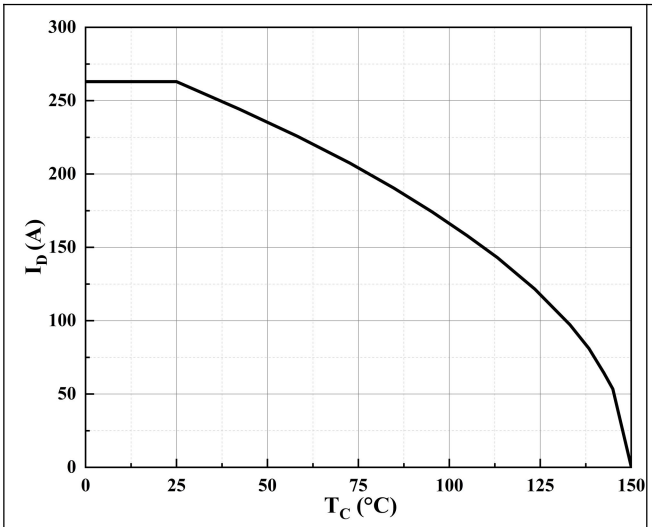


Figure 7. Maximum Continuous Drain Current vs. Case Temperature

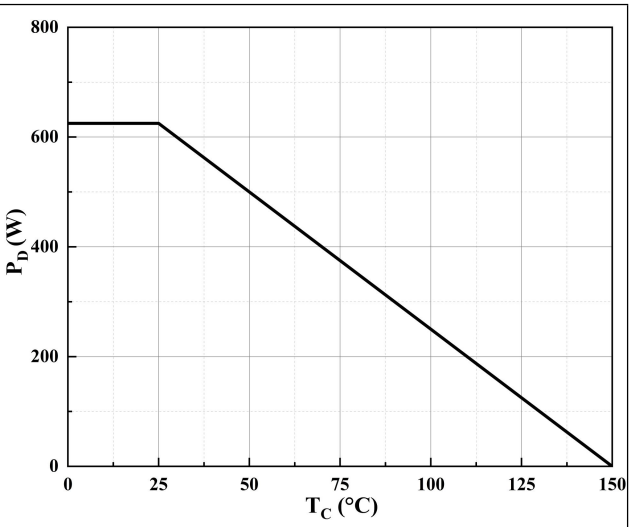


Figure 8. Maximum Power Dissipation vs. Case Temperature

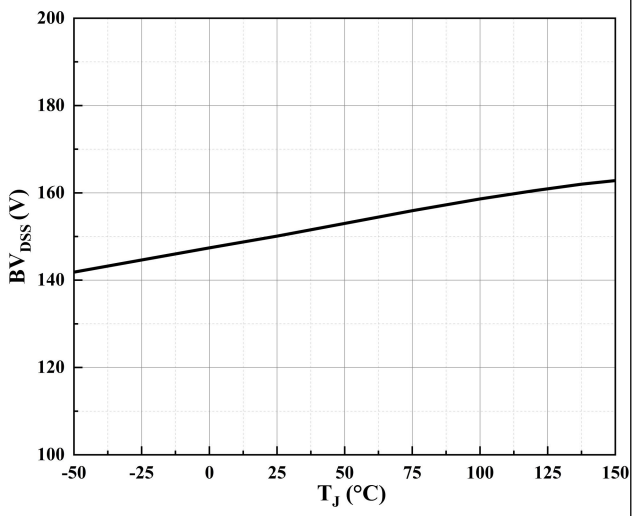


Figure 9. Drain-Source Breakdown Voltage vs. Junction Temperature

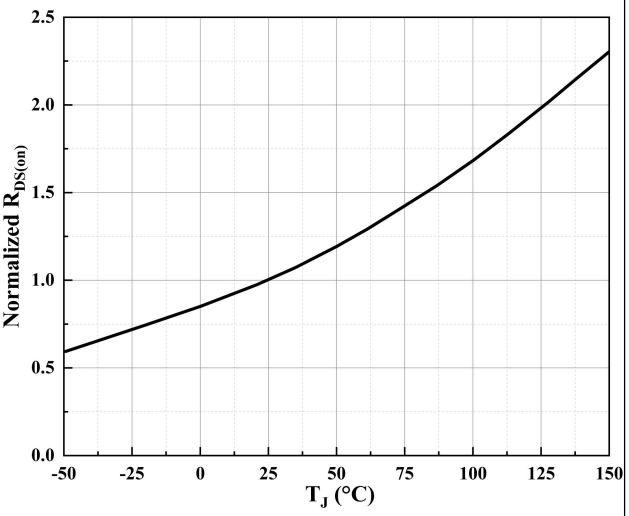


Figure 10. Normalized Static Drain-Source On-Resistance vs. Junction Temperature

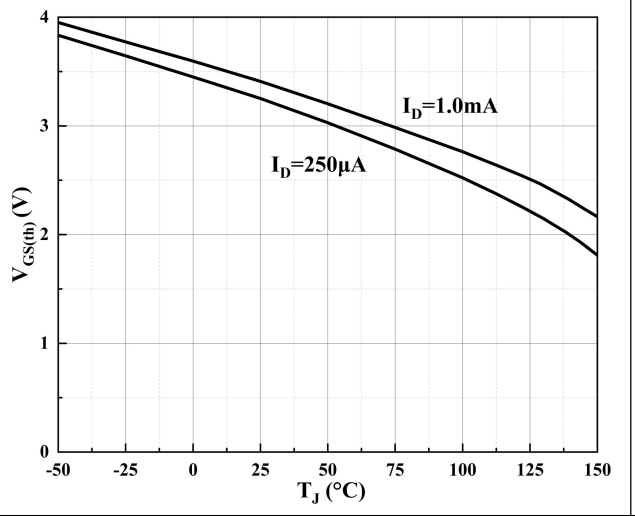


Figure 11. Threshold Voltage vs. Junction Temperature

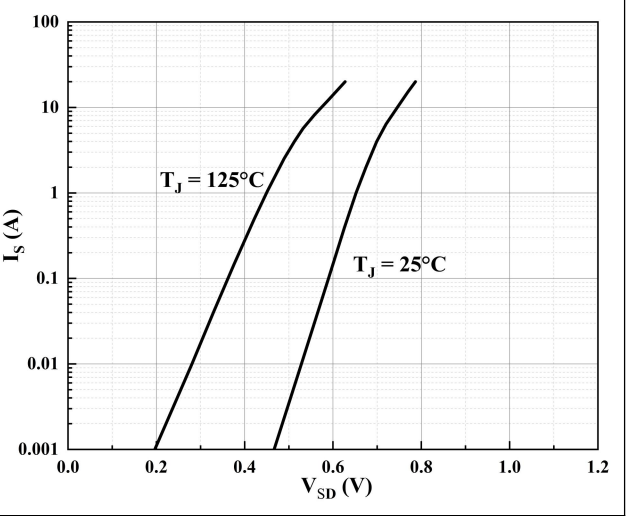


Figure 12. Body Diode Characteristics

■ Characteristic Curve

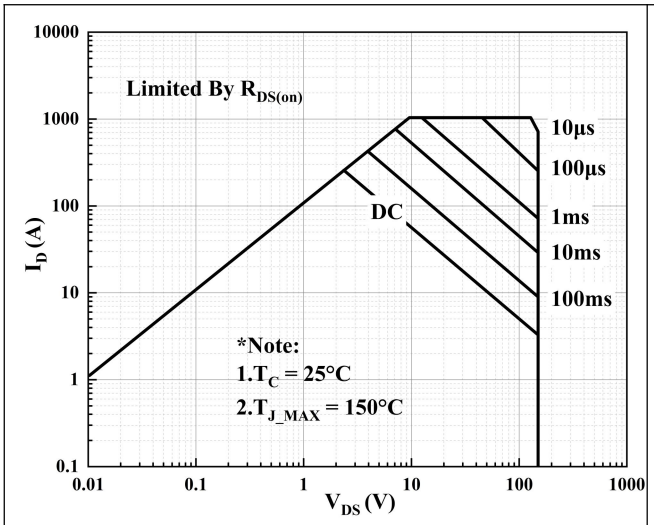


Figure 13. Maximum Safe Operating Area

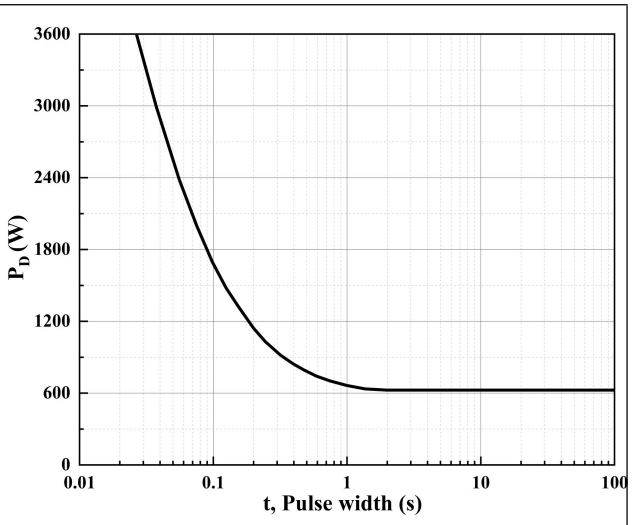


Figure 14. Single Pulse Power Rating, Junction-to-Case

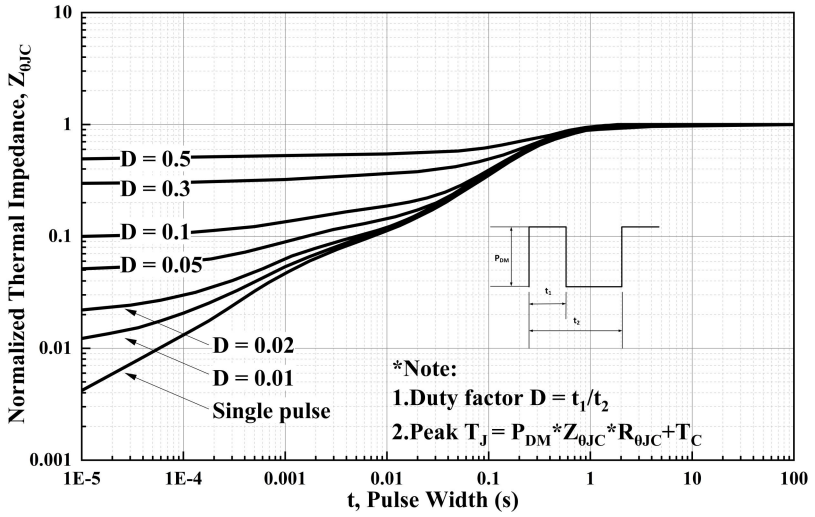
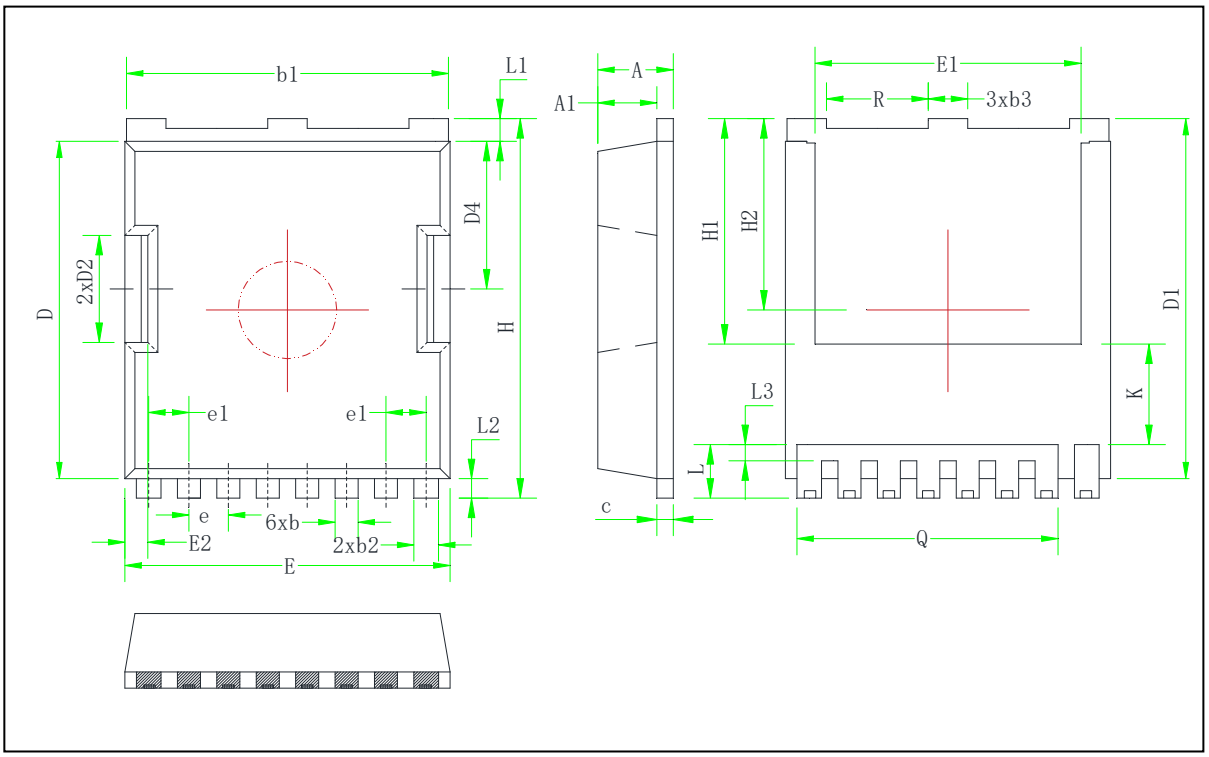


Figure 15. Normalized Maximum Transient Thermal Impedance

■ Package Information

TOLL-8L



Symbol	Min.	Typ.	Max.		Symbol	Min.	Typ.	Max.
A	2.25	2.30	2.35		E	9.85	9.90	9.95
A1	1.75	1.80	1.85		E1	8.00	8.10	8.20
b	0.65	0.70	0.75		E2	0.65	0.70	0.75
b1	9.75	9.80	9.85		H	11.60	11.70	11.80
b2	0.70	0.75	0.80		H1	6.95 BSC		
b3	1.15	1.20	1.25		H2	5.90 BSC		
c	0.45	0.50	0.55		K	3.10 REF		
D	10.35	10.40	10.45		L	1.55	1.65	1.75
D1	11.00	11.10	11.20		L1	0.65	0.70	0.75
D2	3.25	3.30	3.35		L2	0.50	0.60	0.70
D4	4.50	4.55	4.60		L3	0.40	0.50	0.60
e	1.20 BSC				Q	7.95 REF		
e1	1.225 BSC				R	3.00	3.10	3.20