NCE N-Channel Super Trench III Power MOSFET

Description

The series of devices uses **Super Trench III** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g. This device is ideal for high-frequency switching and synchronous rectification.

Application

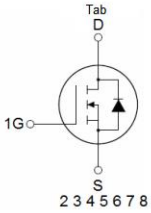
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

- V_{DS} =150V,I_D =265A
  $R_{DS(ON)}$=3.3mΩ , typical @ V_{GS}=10V
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating

100% UIS TESTED!
100% ΔVds TESTED!

TOLL



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCEP040NH150LL	NCEP040NH150LL	TOLL	-	-	-

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	265	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	186	A
Pulsed Drain Current	I_{DM}	1060	A
Maximum Power Dissipation	P_D	618	W
Derating factor		4.0	W/℃
Single pulse avalanche energy (Note 1)	E_{AS}	1697	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	0.25	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

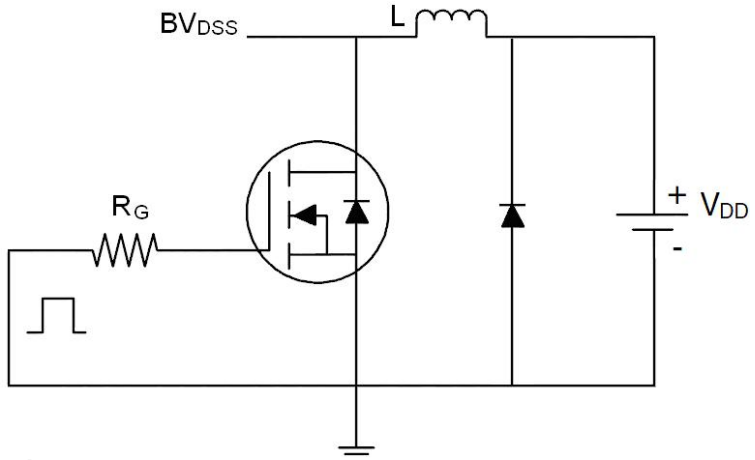
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	150	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=150V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	2.5	3.3	4.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A	-	3.3	4.0	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=40A	-	75	-	S
Dynamic Characteristics						
Input Capacitance	C_{lss}	V_{DS}=75V,V_{GS}=0V, F=1.0MHz	-	7150	-	PF
Output Capacitance	C_{oss}		-	2050	-	PF
Reverse Transfer Capacitance	C_{rss}		-	47	-	PF
Switching Characteristics (Note 2)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=75V,I_D=75A V_{GS}=10V,R_G=4.7Ω	-	30	-	nS
Turn-on Rise Time	t_r		-	40	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	70	-	nS
Turn-Off Fall Time	t_f		-	15	-	nS
Total Gate Charge	Q_g	V_{DS}=75V,I_D=20A, V_{GS}=10V	-	106	-	nC
Gate-Source Charge	Q_{gs}		-	36	-	nC
Gate-Drain Charge	Q_{gd}		-	27	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_F=20A	-	-	1.2	V
Diode Forward Current	I_S		-	-	265	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = 100A di/dt = 100A/μs	-	108	-	nS
Reverse Recovery Charge	Qrr		-	270	-	nC

Notes:

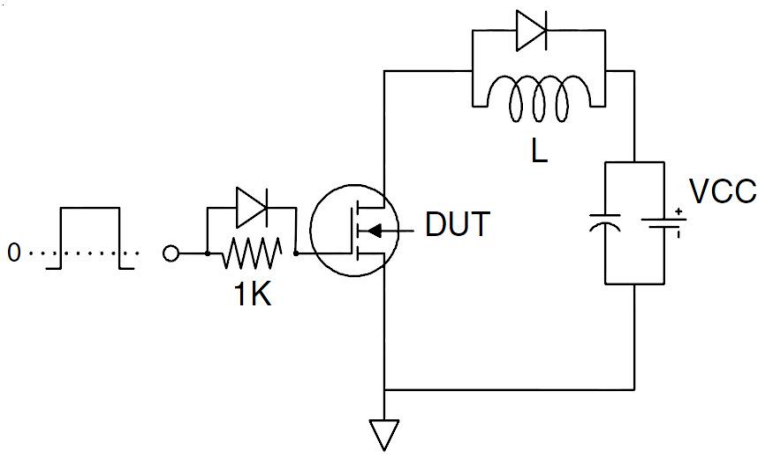
1. EAS condition : Tj=25℃,V_{DD}=50V,V_G=10V,L=0.5mH,Rg=25Ω
2. Guaranteed by design, not subject to production
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of TJ(MAX)=175°C. The SOA curve provides a single pulse rating.

Test Circuit

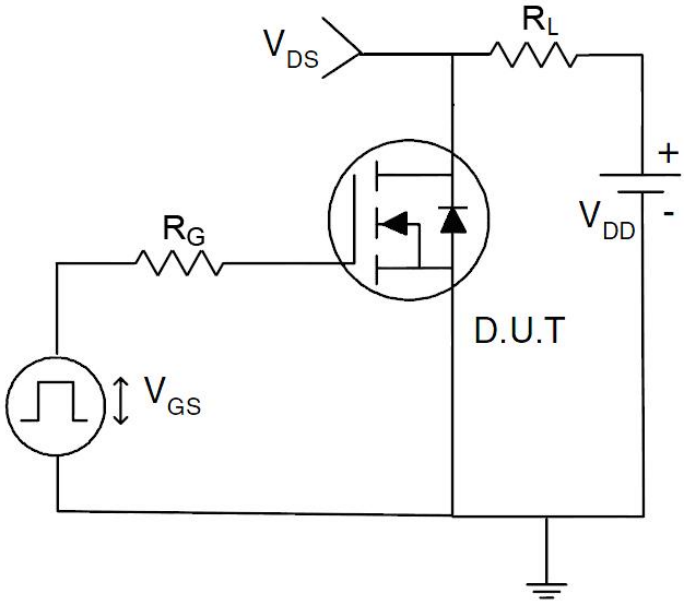
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

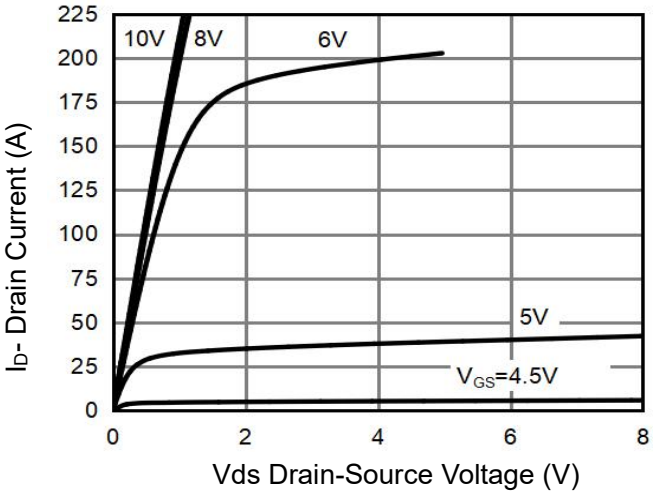


Figure 1 Output Characteristics

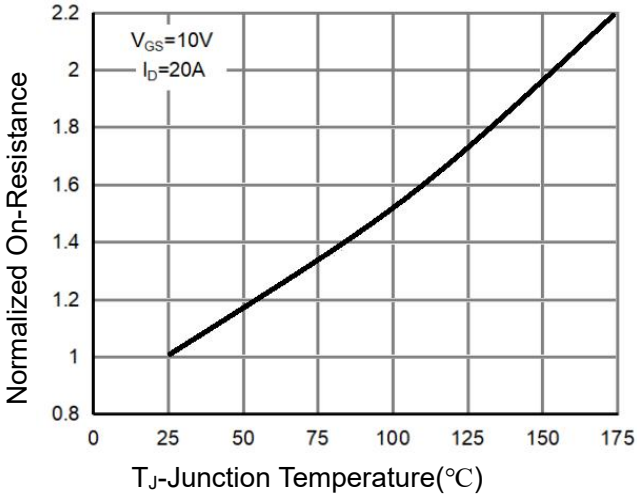


Figure 4 Rdson-JunctionTemperature

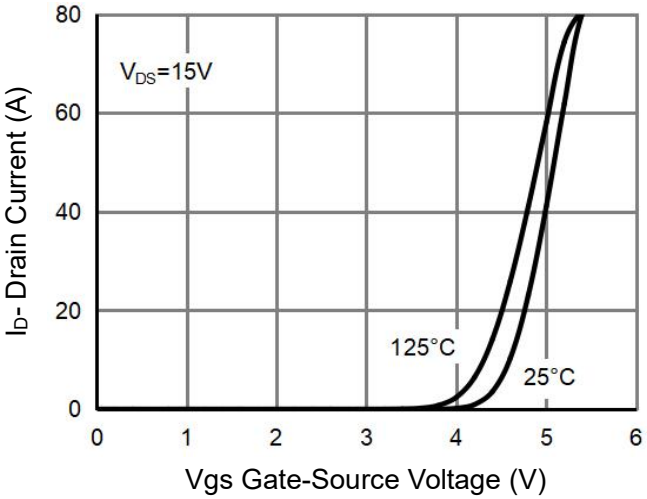


Figure 2 Transfer Characteristics

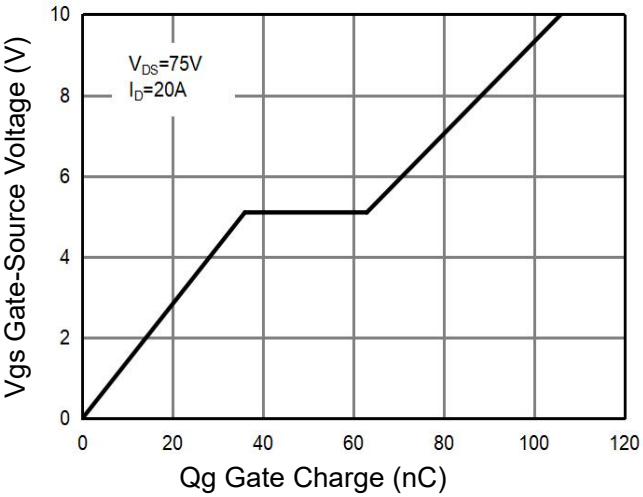


Figure 5 Gate Charge

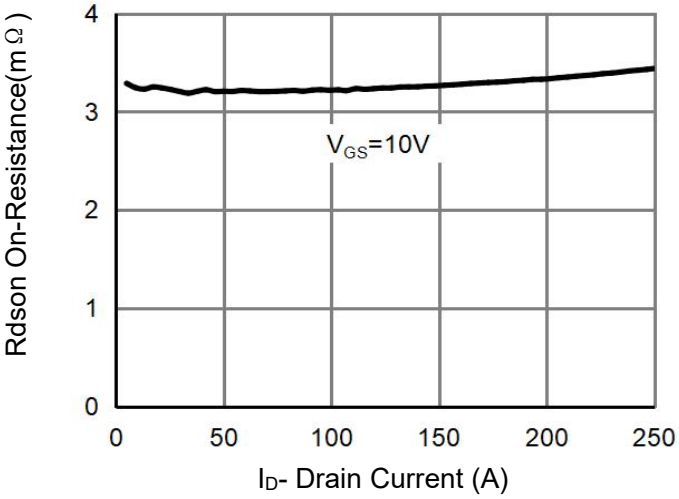


Figure 3 Rdson- Drain Current

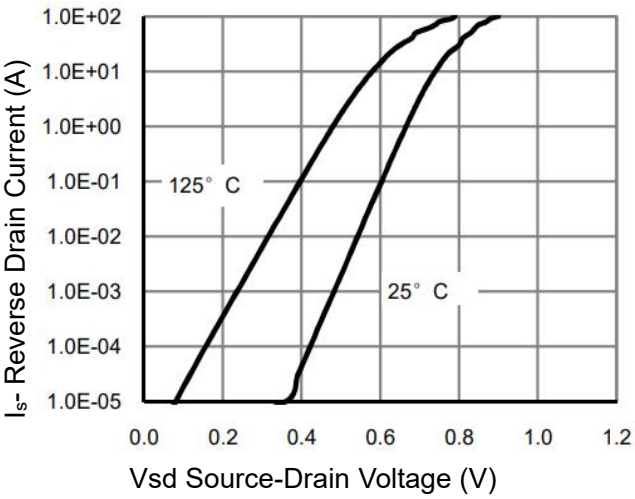


Figure 6 Source- Drain Diode Forward

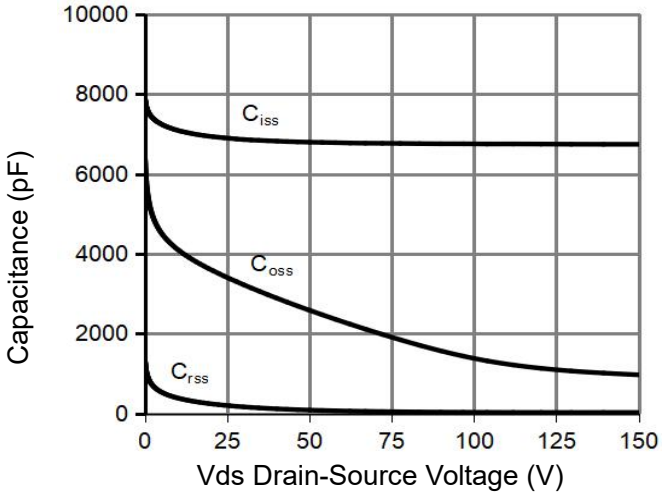


Figure 7 Capacitance vs Vds

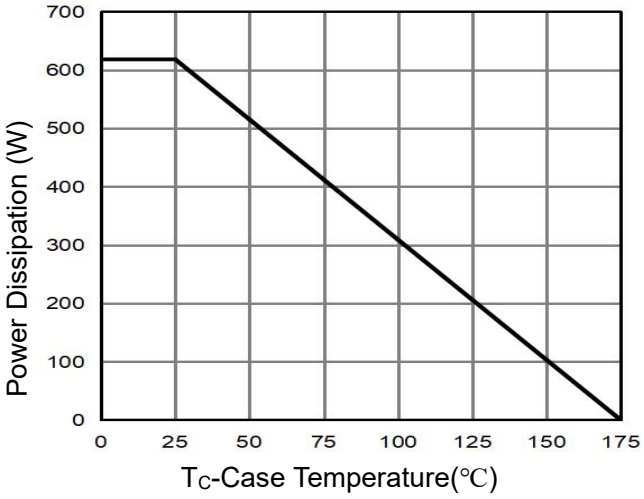


Figure 10 Power De-rating

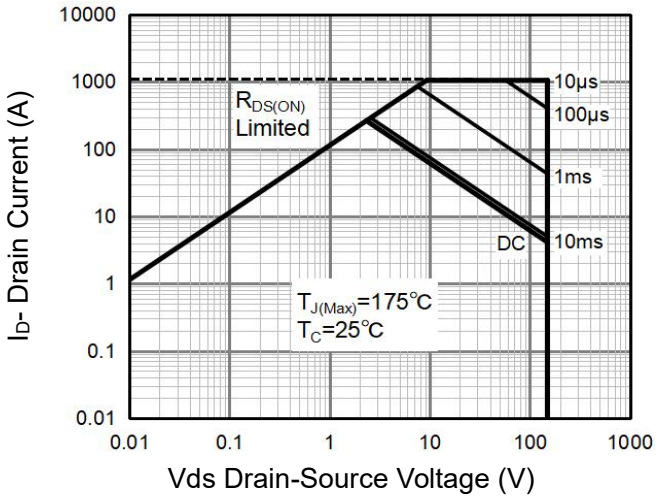


Figure 8 Safe Operation Area (Note3)

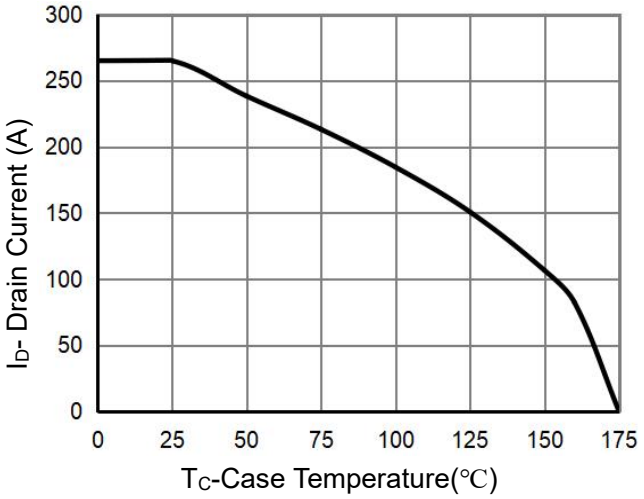


Figure 11 Current De-rating

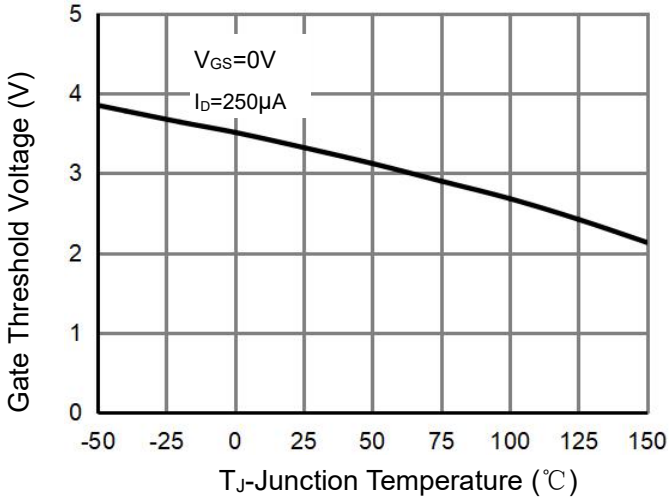


Figure 9 $V_{GS(th)}$-Junction Temperature

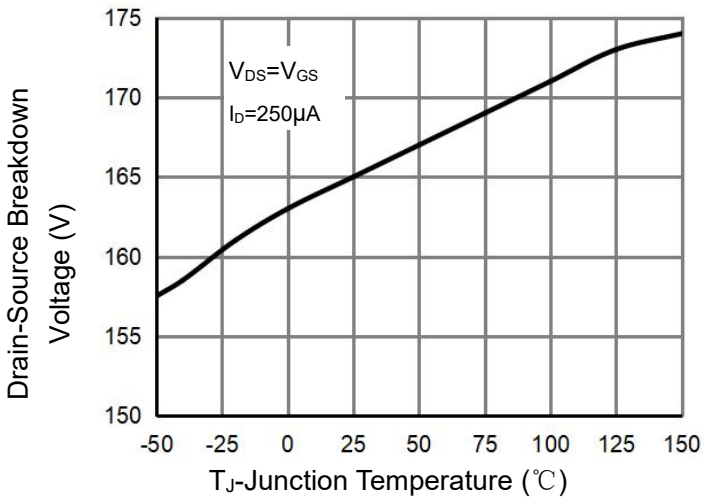


Figure12 BV_{DSS}-Junction Temperature

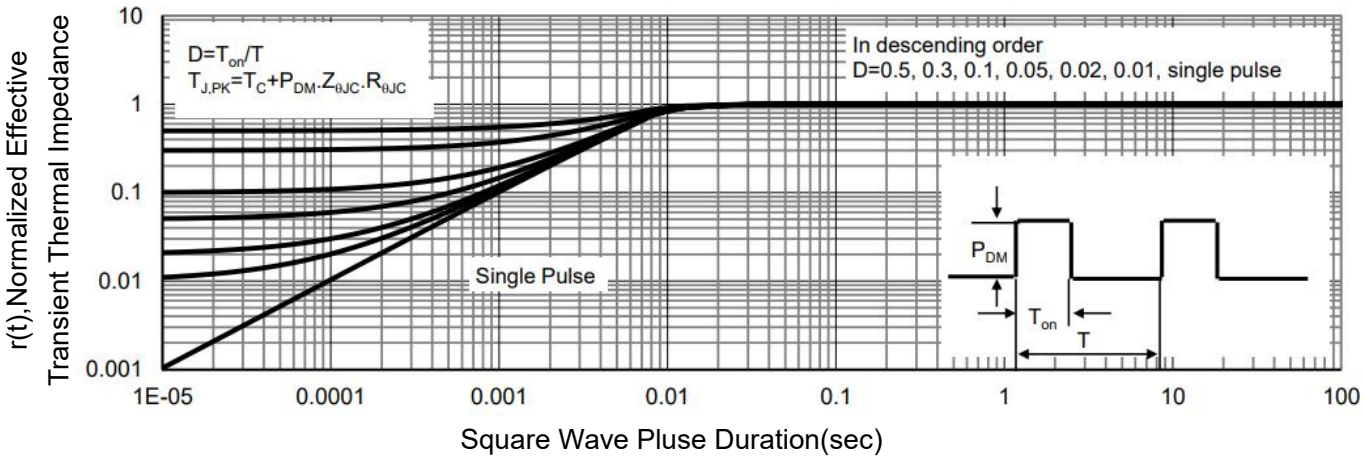
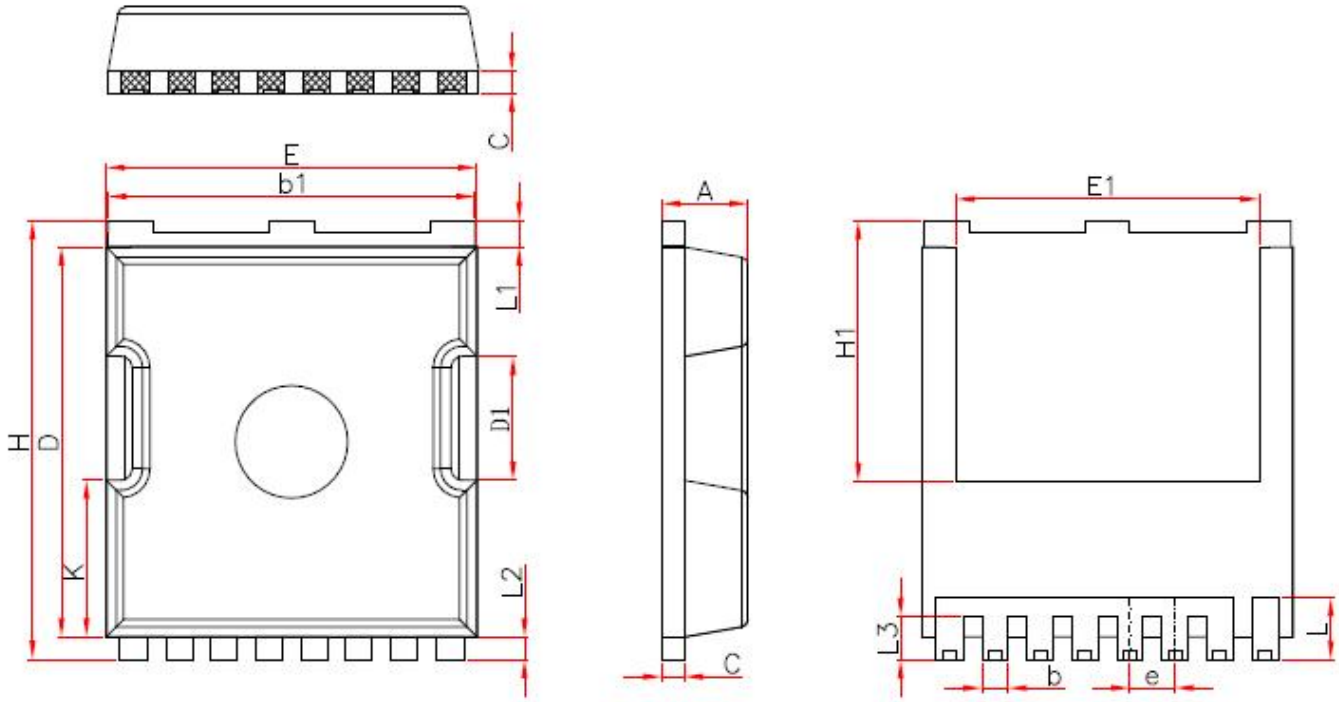


Figure 13 Normalized Maximum Transient Thermal Impedance

TOLL Package Information



Symbol	Millimeters		
	Min.	Nom.	Max.
A	2.20	2.30	2.40
b	0.65	0.75	0.85
b1	9.70	9.80	9.90
C	0.50	0.60	0.70
D	10.30	10.40	10.50
D1	3.15	3.3	3.45
E	9.70	9.90	10.10
E1	8.00	8.10	8.20
e	1.10	1.20	1.30
H	11.6	11.7	11.8
H1	6.85	6.95	7.05
K	4.08	4.18	4.28
L	1.60	1.65	2.10
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L3	1.05	1.20	1.30

Revision History

Revision	Date	Subjects
V1.0	2023.11.02	Product data sheet
V2.0	2024.03.05	Update Current De-rating $R_{DS(ON)}$Typ Value

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