

## NCE N-Channel Super Trench Power MOSFET

### Description

The series of devices uses **Super Trench** 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

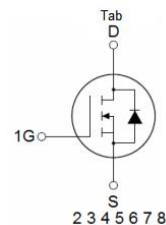
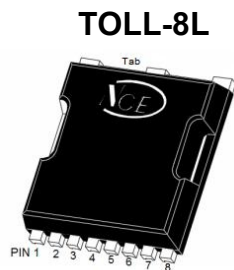
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

### General Features

- $V_{DS}=150V, I_D=255A$   
 $R_{DS(ON)}=4.2m\Omega$ , 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%  $\Delta V_{ds}$  TESTED!**



Schematic Diagram

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCEP15T26LL	NCEP15T26LL	TOLL-8L	-	-	-

### Absolute Maximum Ratings ( $T_c=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	150	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous ( $T_c=25^\circ\text{C}$ )	$I_D (T_c=25^\circ\text{C})$	255	A
Drain Current-Continuous ( $T_c=100^\circ\text{C}$ )	$I_D (T_c=100^\circ\text{C})$	180	A
Pulsed Drain Current	$I_{DM}$	1020	A
Maximum Power Dissipation ( $T_c=25^\circ\text{C}$ )	$P_D (T_c=25^\circ\text{C})$	690	W
Derating factor		4.6	W/ $^\circ\text{C}$
Single pulse avalanche energy (Note 1)	$E_{AS}$	1797	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 175	$^\circ\text{C}$

### Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.22	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient (Note 4)	$R_{\theta JA}$	40	$^\circ\text{C/W}$

## Electrical Characteristics (T<sub>c</sub>=25°C unless otherwise noted)

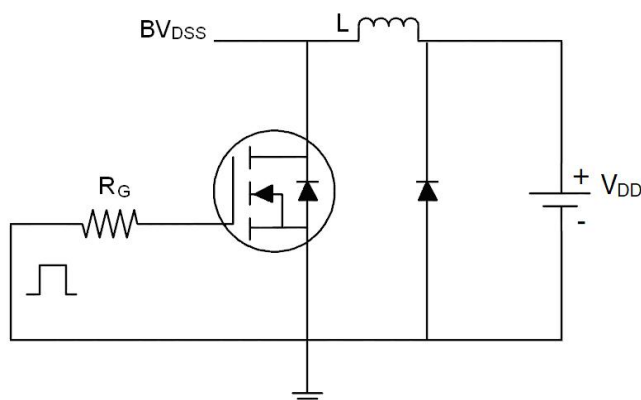
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	150		-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =150V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0	3.0	4.0	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	4.2	4.7	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =20A	70	-	-	S
Dynamic Characteristics						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =75V, V <sub>GS</sub> =0V, F=1.0MHz	-	7100	-	pF
Output Capacitance	C <sub>oss</sub>		-	890	-	pF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	30	-	pF
Switching Characteristics <small>(Note 2)</small>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =75V, I <sub>D</sub> =20A V <sub>GS</sub> =10V, R <sub>G</sub> =4.7Ω	-	36	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	40	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	60	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	30	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =75V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V	-	97	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	32.5	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	22.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>F</sub> =20A	-		1.2	V
Diode Forward Current	I <sub>S</sub>		-	-	255	A
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> = I <sub>S</sub>	-	160		nS
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 100A/μs	-	720		nC

### Notes:

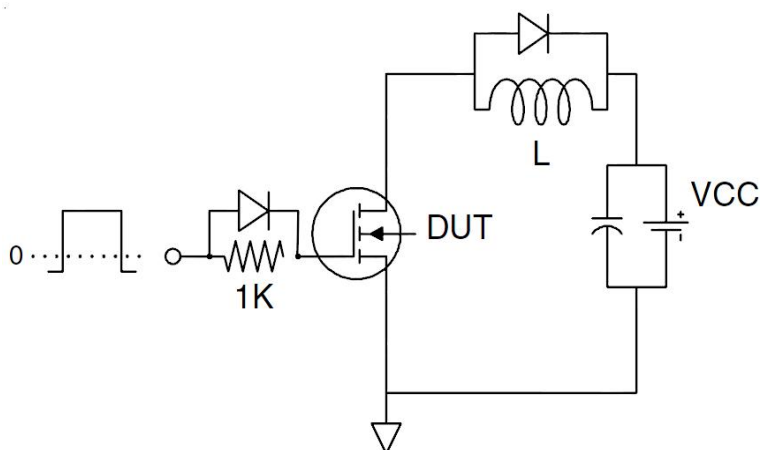
1. EAS condition : T<sub>J</sub>=25°C, V<sub>DD</sub>=50V, V<sub>G</sub>=10V, L=0.5mH, R<sub>G</sub>=25Ω
2. Guaranteed by design, not subject to production
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=175°C. The SOA curve provides a single pulse rating.
4. The value of R<sub>θJA</sub> is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.

## Test Circuit

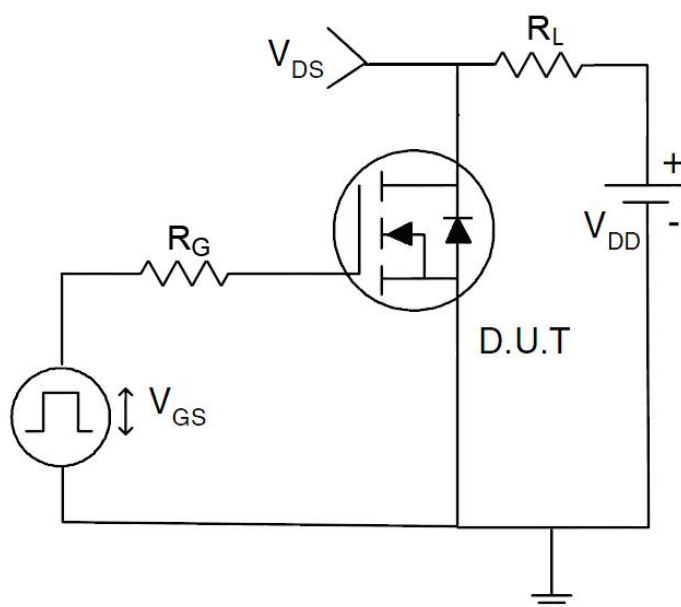
### 1) $E_{AS}$ test Circuit



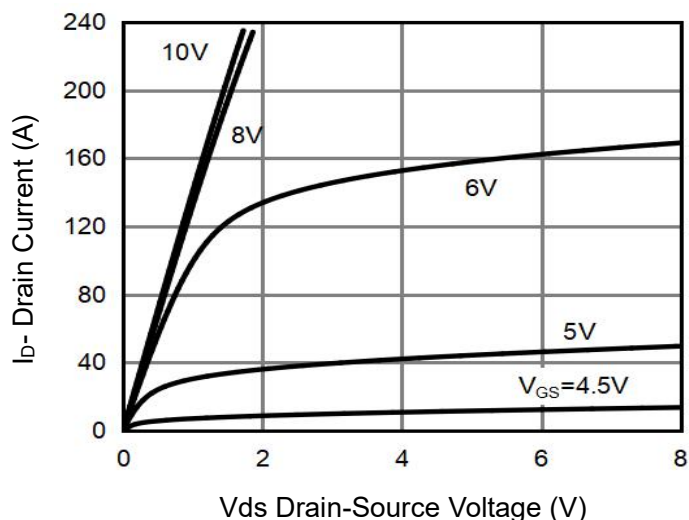
### 2) Gate charge test Circuit



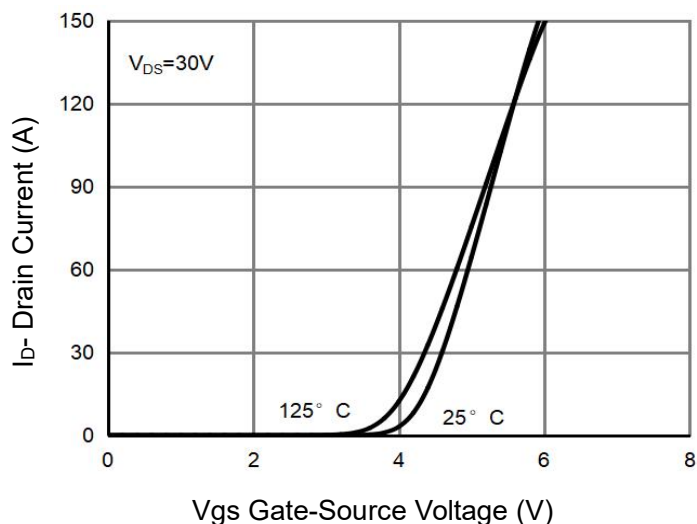
### 3) Switch Time Test Circuit



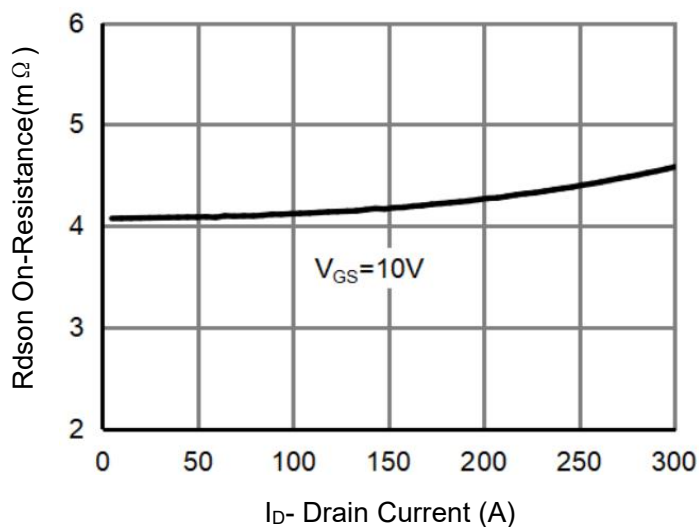
## Typical Electrical and Thermal Characteristics



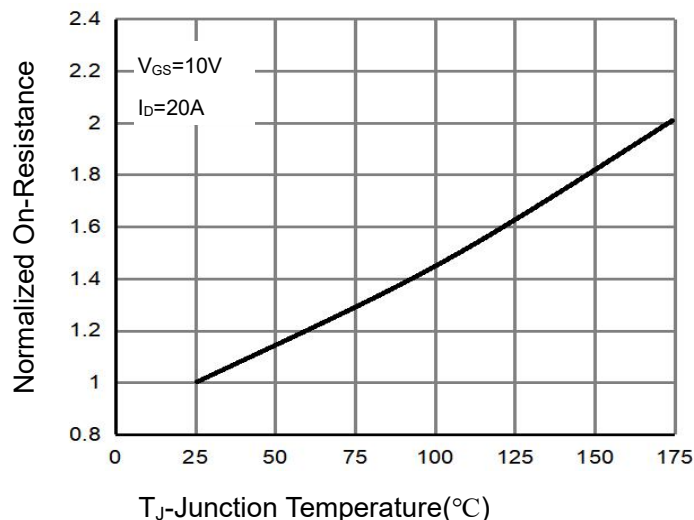
**Figure 1 Output Characteristics**



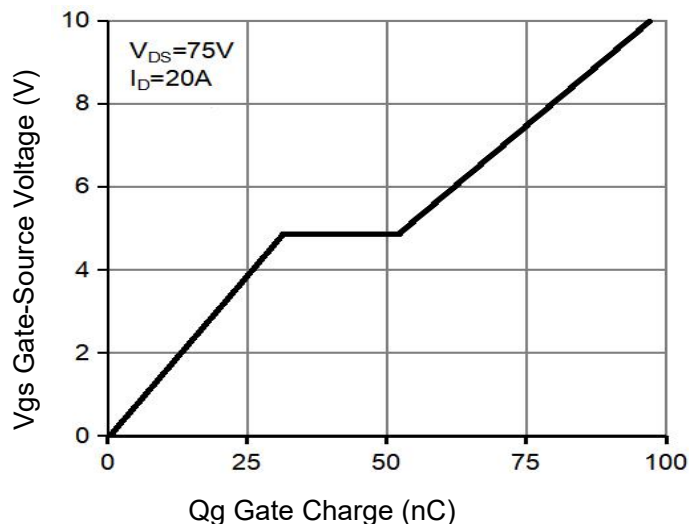
**Figure 2 Transfer Characteristics**



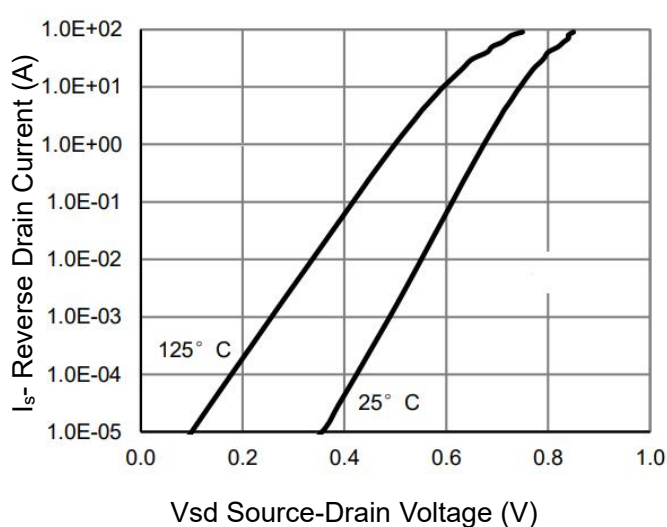
**Figure 3 Rdson- Drain Current**



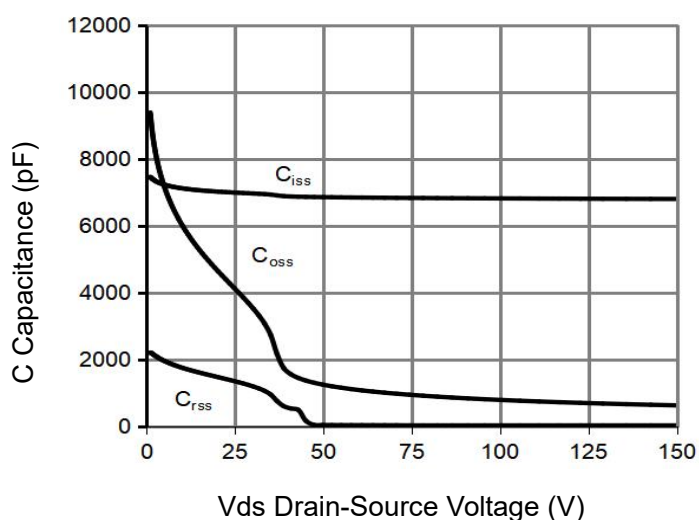
**Figure 4 Rdson-Junction Temperature**



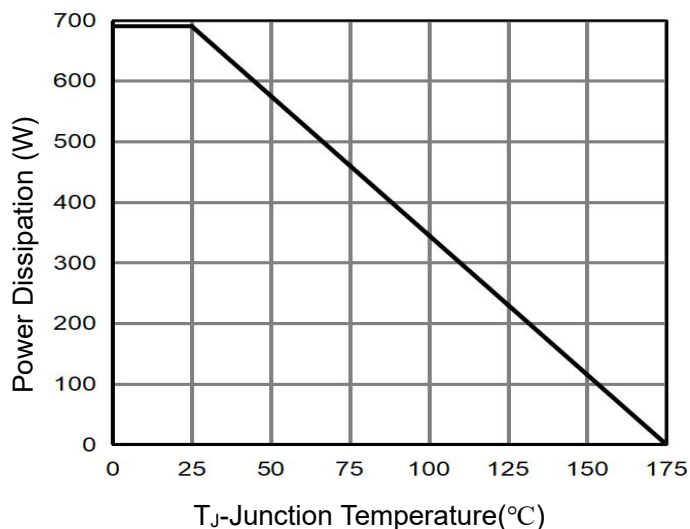
**Figure 5 Gate Charge**



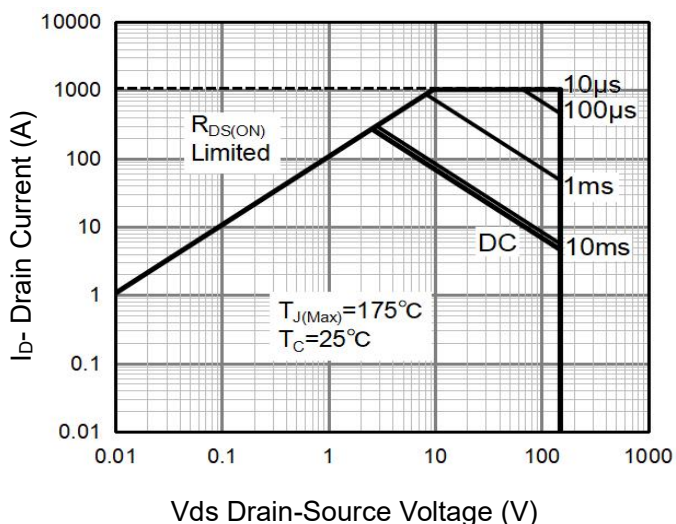
**Figure 6 Source- Drain Diode Forward**



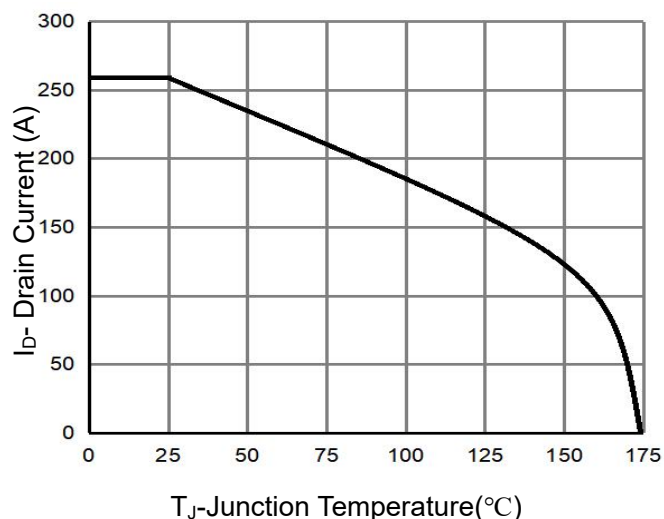
**Figure 7 Capacitance vs Vds**



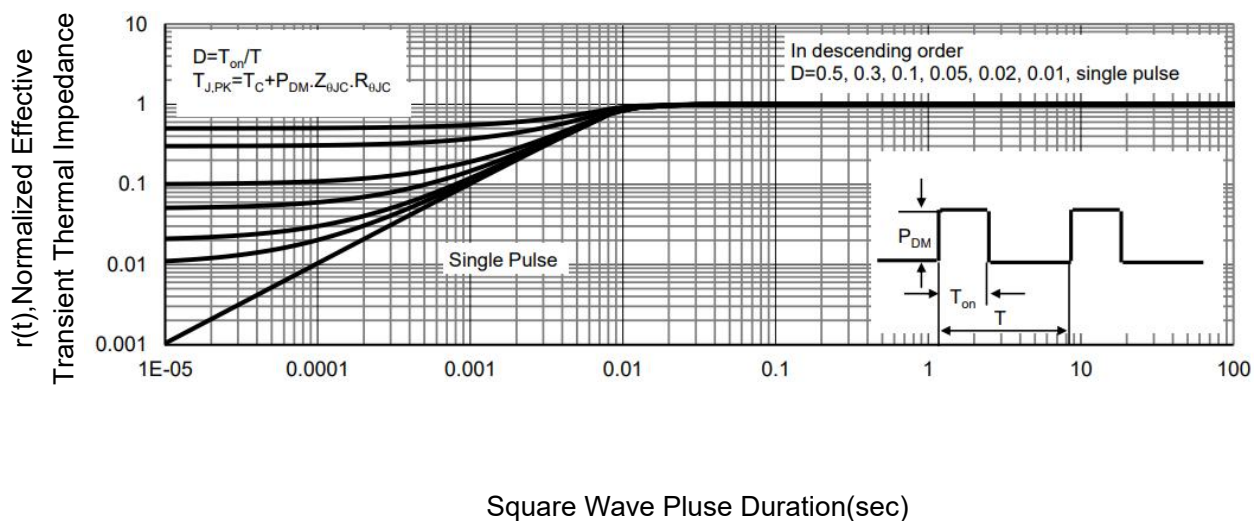
**Figure 9 Power De-rating**



**Figure 8 Safe Operation Area** (Note3)

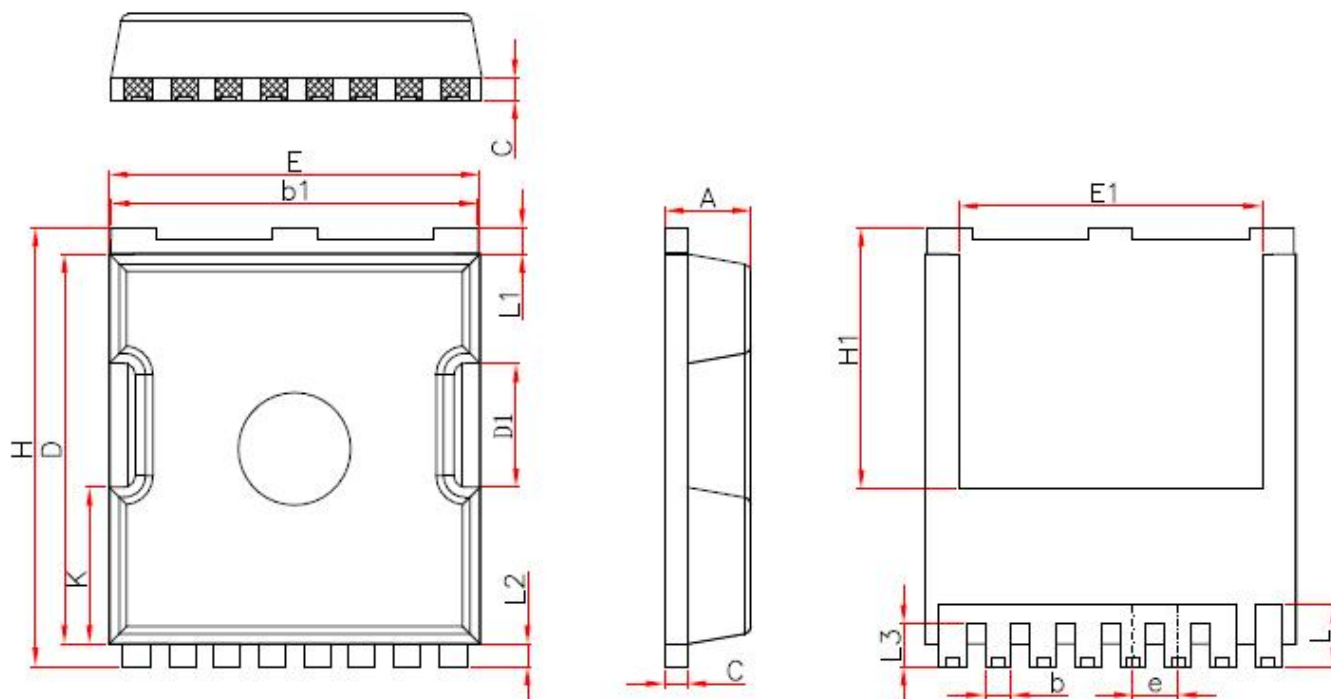


**Figure 10 Current De-rating**



**Figure 11 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

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