

## NCE N-Channel Super Trench III Power MOSFET

### Description

The NCEP088NH150GU 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

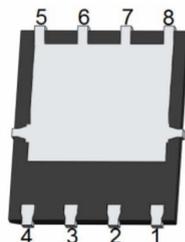
### General Features

- $V_{DS} = 150V, I_D = 103A$   
 $R_{DS(ON)} = 7.8m\Omega$  (typical) @  $V_{GS} = 10V$
- Excellent gate charge x  $R_{DS(on)}$  product(FOM)
- Very low on-resistance  $R_{DS(on)}$
- 150 °C operating temperature
- 100% UIS tested
- 100%  $\Delta V_{ds}$  tested
- Pb-free lead plating

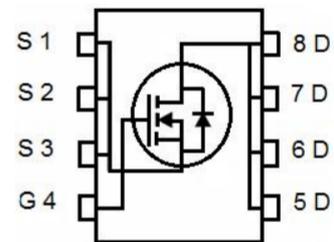
**DFN 5X6-8L**



**Top View**



**Bottom View**



**Schematic Diagram**

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
P088NH150GU	NCEP088NH150GU	DFN5X6-8L	-	-	-

### Absolute Maximum Ratings ( $T_C = 25^\circ C$ 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	$I_D$	103	A
Drain Current-Continuous( $T_C = 100^\circ C$ )	$I_D(100^\circ C)$	65	A
Pulsed Drain Current	$I_{DM}$	412	A
Maximum Power Dissipation	$P_D$	180	W
Derating factor		1.44	W/ $^\circ C$
Single pulse avalanche energy <sup>(Note 1)</sup>	$E_{AS}$	501	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.7	$^\circ C/W$
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## Electrical Characteristics (T<sub>C</sub>=25°C unless otherwise noted)

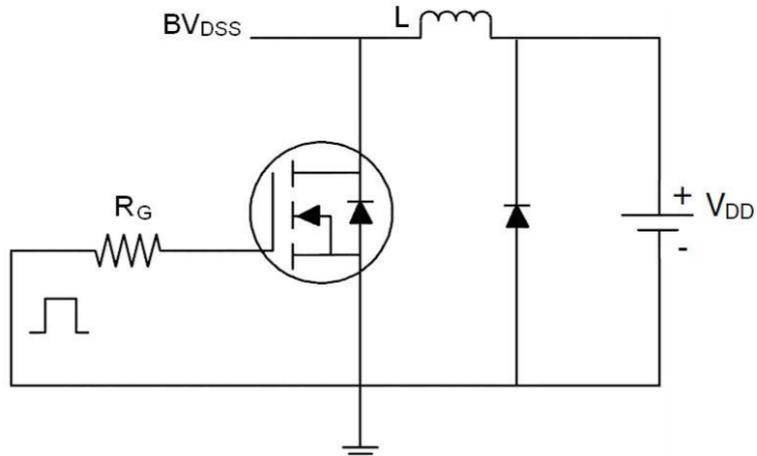
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	150	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =150V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.5	3.3	4.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	7.8	8.8	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =40A	-	30	-	S
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =75V, V <sub>GS</sub> =0V, F=1.0MHz	-	2738	-	pF
Output Capacitance	C <sub>oss</sub>		-	932	-	pF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	30	-	pF
<b>Switching Characteristics</b> (Note 2)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =75V, I <sub>D</sub> =40A V <sub>GS</sub> =10V, R <sub>G</sub> =4.7Ω	-	6	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	3.5	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	16.5	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	5	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =75V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V	-	48	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	15	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	14.5	-	nC
<b>Drain-Source Diode Characteristics</b>						
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>		-	-	103	A
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> = 40A	-	64	-	nS
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 100A/μs	-	135	-	nC

### Notes:

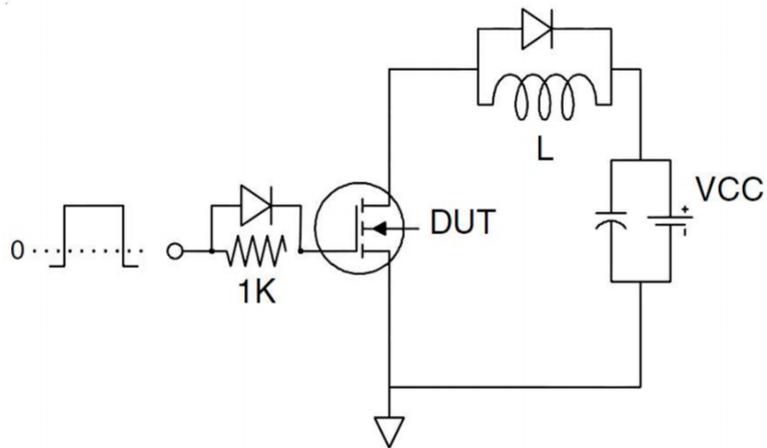
1. EAS condition : T<sub>J</sub>=25°C, V<sub>DD</sub>=50V, V<sub>G</sub>=10V, L=0.5mH, R<sub>G</sub>=25Ω
2. Guaranteed by design, not subject to production
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150°C. The SOA curve provides a single pulse rating.

## Test Circuit

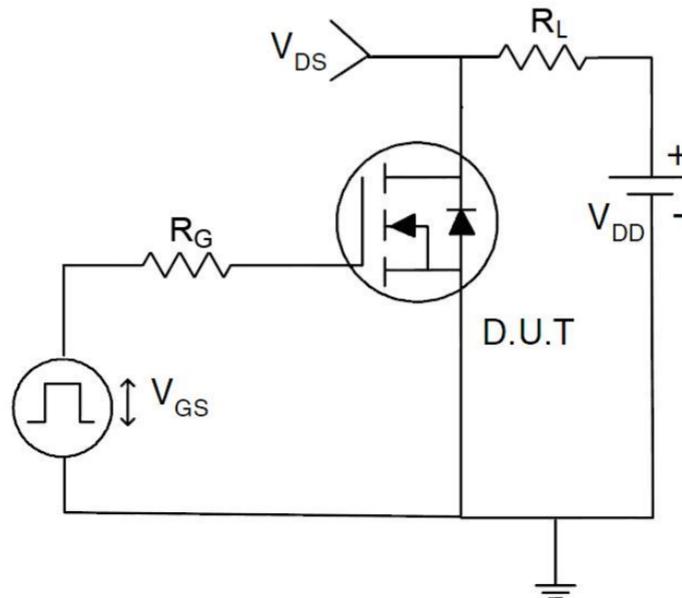
### 1) E<sub>AS</sub> test Circuit



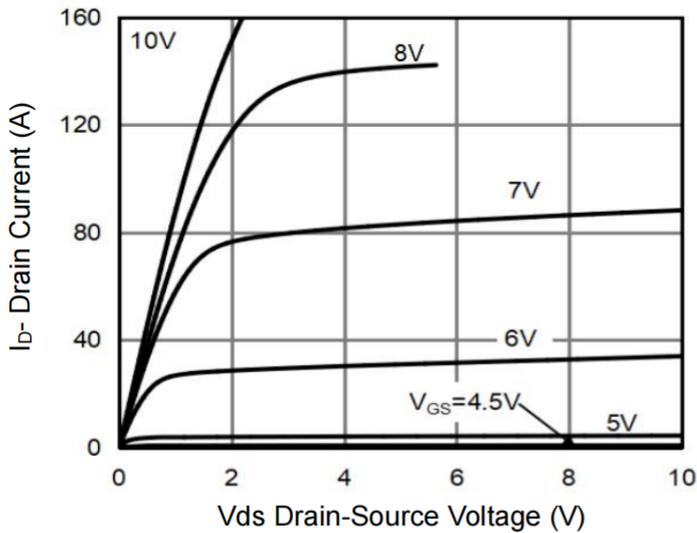
### 2) Gate charge test Circuit



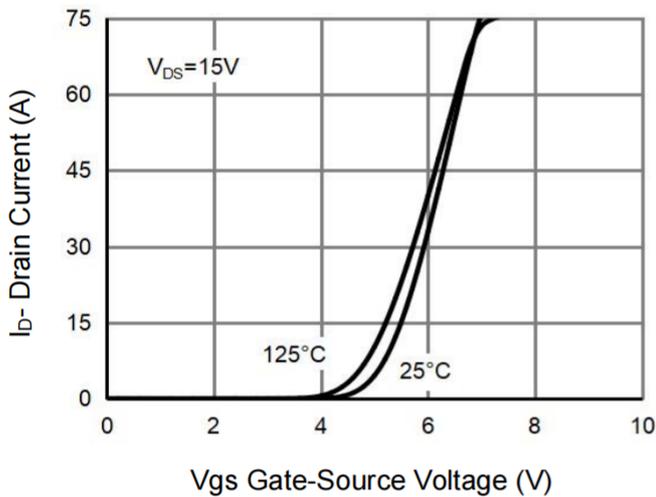
### 3) Switch Time Test Circuit



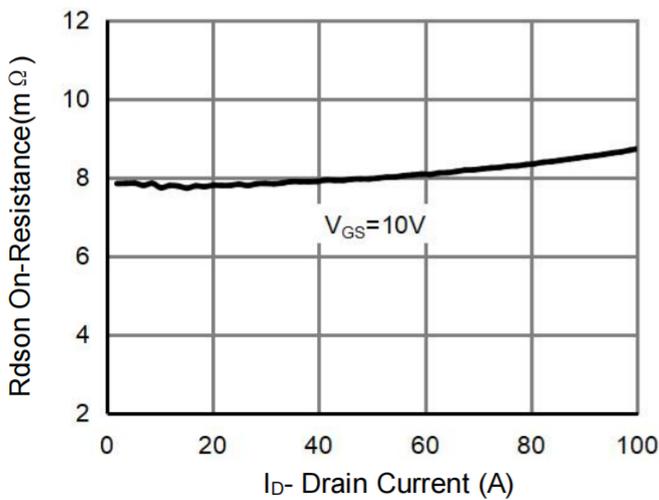
## Typical Electrical and Thermal Characteristics



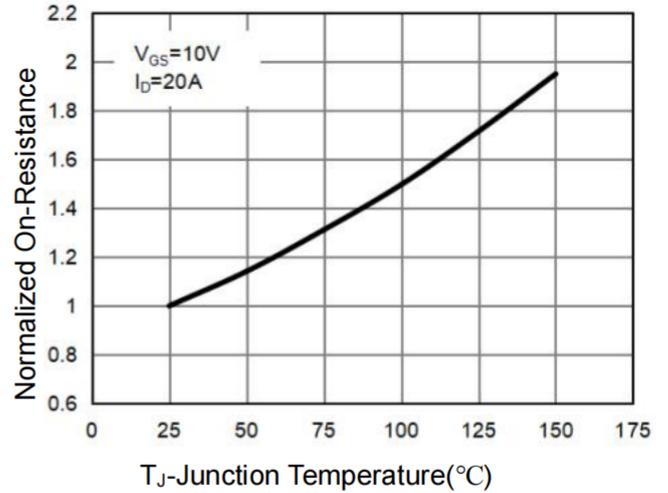
**Figure 1 Output Characteristics**



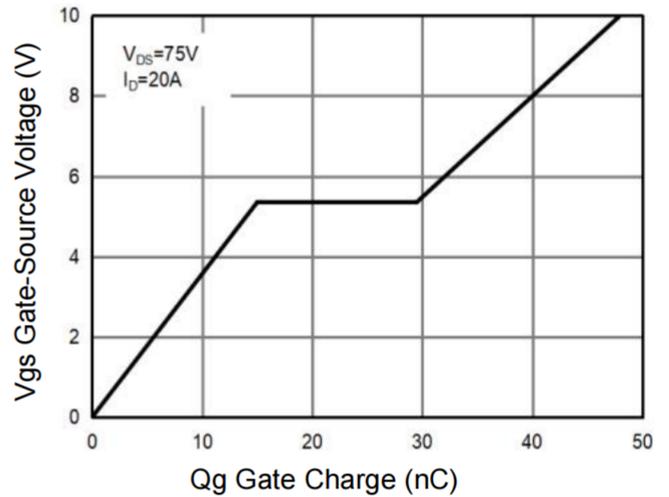
**Figure 2 Transfer Characteristics**



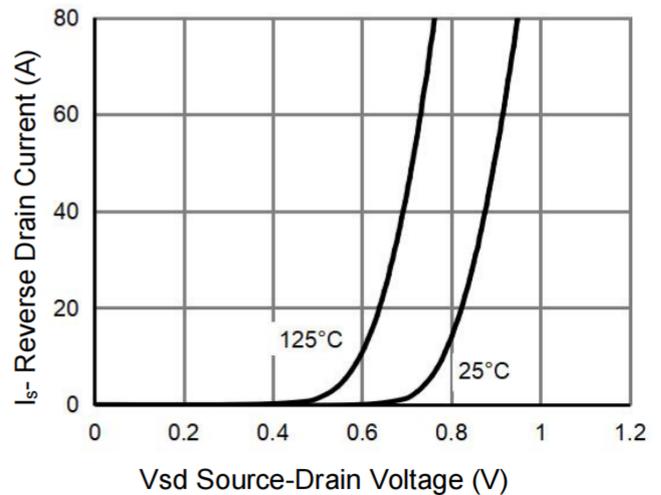
**Figure 3 Rdson- Drain Current**



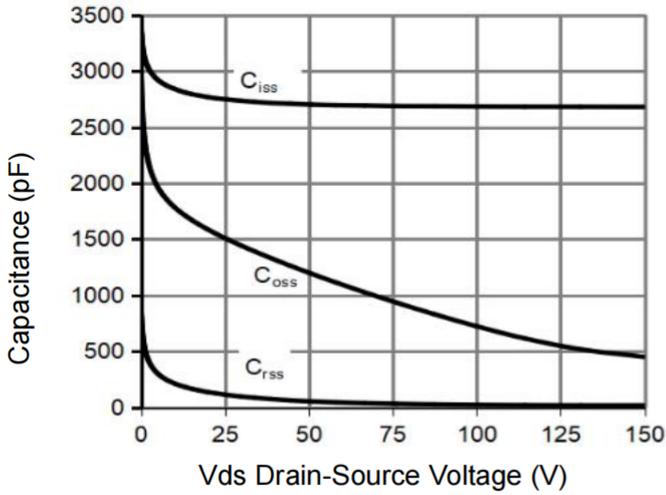
**Figure 4 Rdson-Junction Temperature**



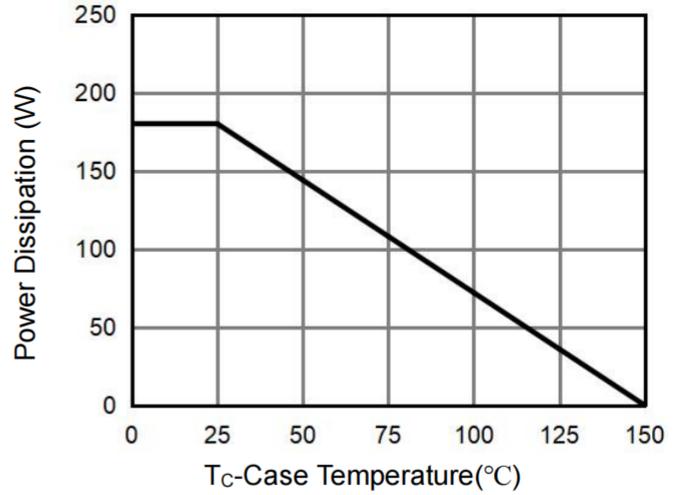
**Figure 5 Gate Charge**



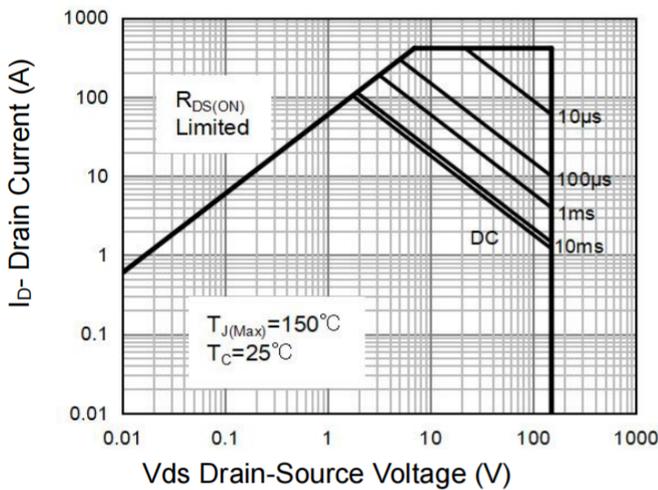
**Figure 6 Source- Drain Diode Forward**



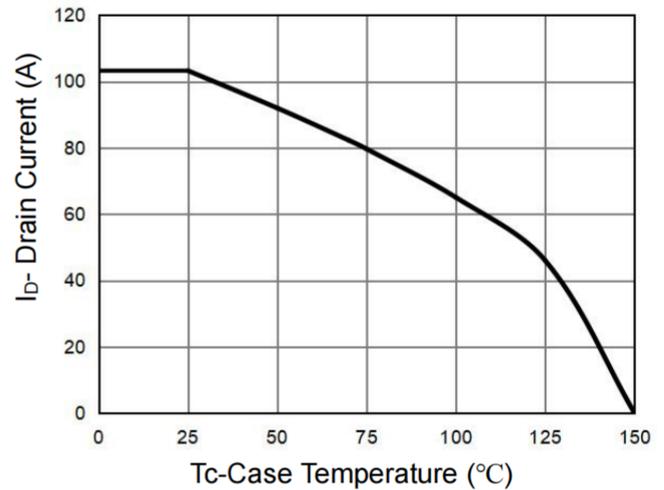
**Figure 7 Capacitance vs Vds**



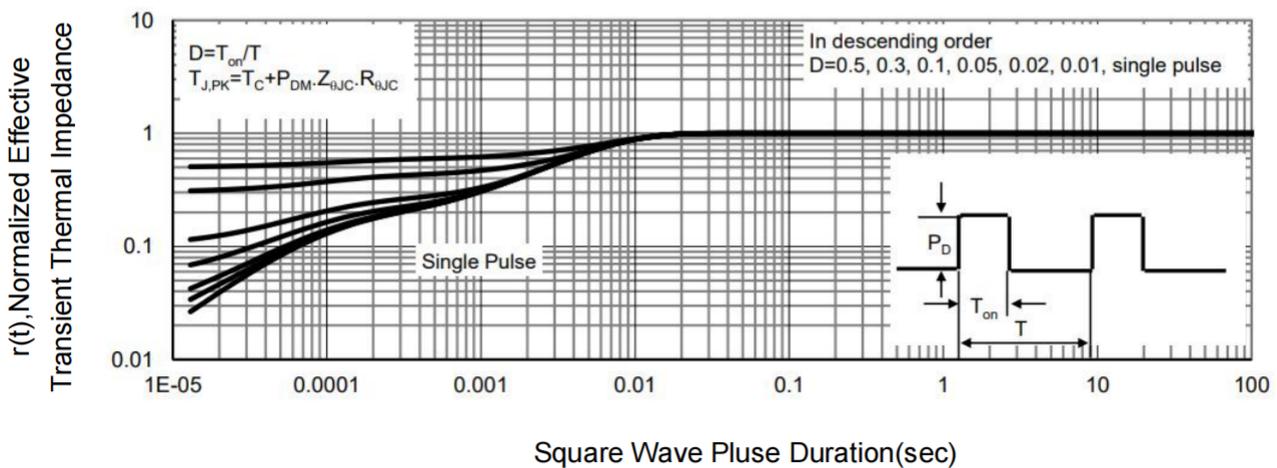
**Figure 9 Power De-rating**



**Figure 8 Safe Operation Area** (Note 3)

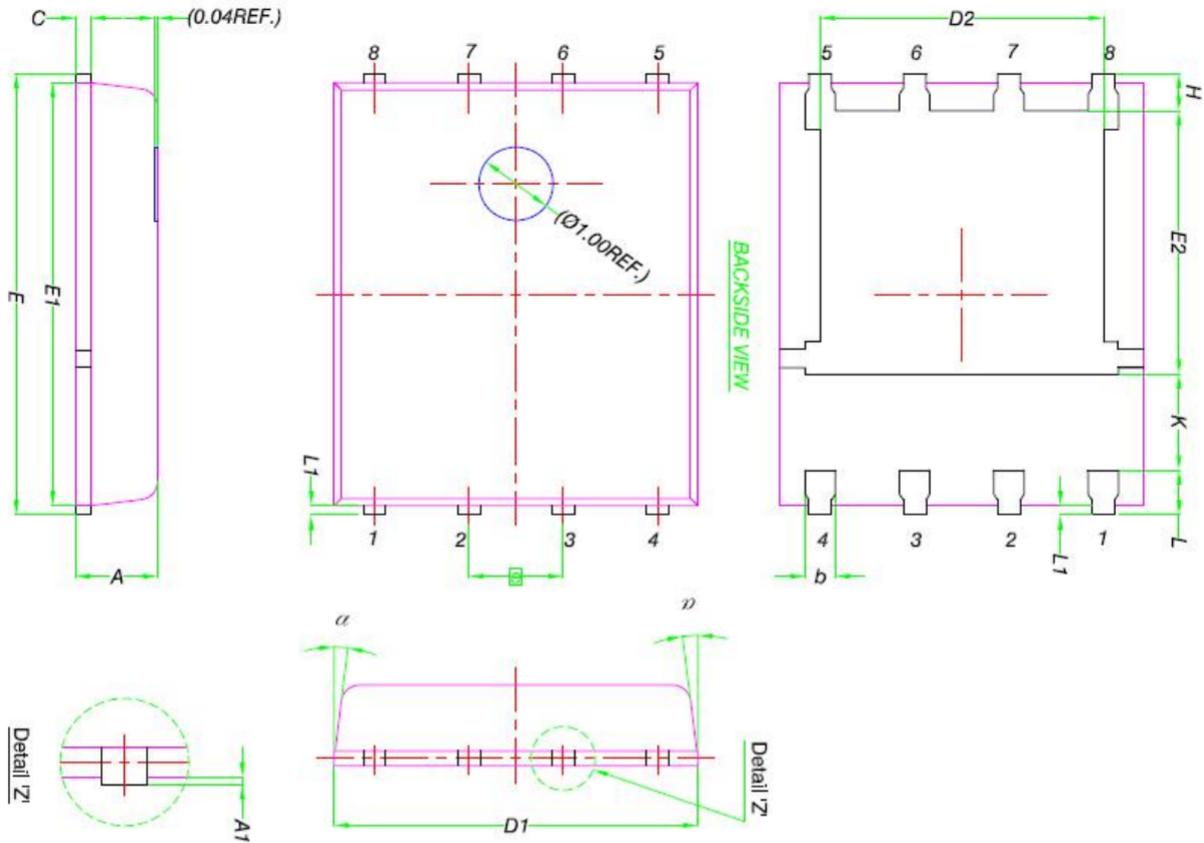


**Figure 10 Current De-rating**

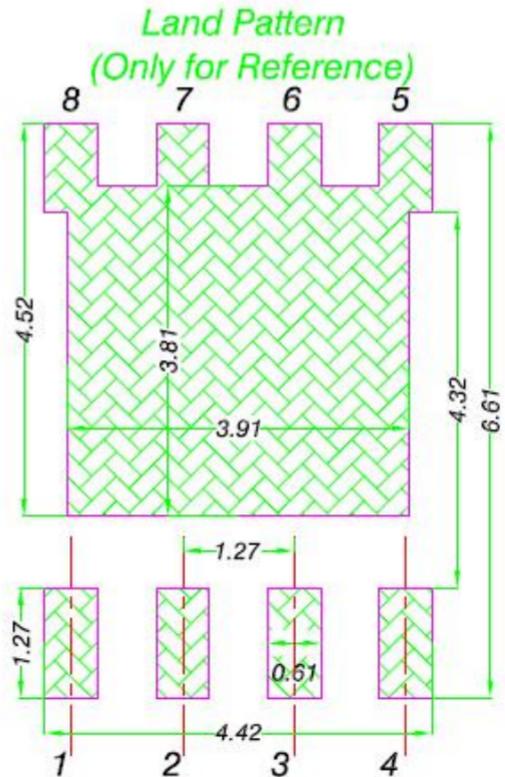


**Figure 11 Normalized Maximum Transient Thermal Impedance**

## DFN5X6-8L Package Information



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0	-	0.05
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
α	0°	-	12°



## Revision History

Revision	Date	Subjects
V1.0	2023.11.08	Product data sheet
V2.0	2025.08.22	Correction Figure 4 Update ID & Figure 8 & Figure 10 Update Switching Characteristics Update Drain-Source Diode Characteristics

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