

## NCE N-Channel Enhancement Mode Power MOSFET

### Description

The NCE3065Q uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### Application

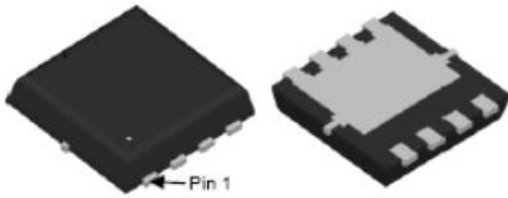
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

**100% UIS TESTED!**  
**100%  $\Delta V_{ds}$  TESTED!**

### General Features

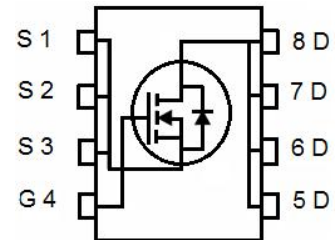
- $V_{DS} = 30V, I_D = 65A$   
 $R_{DS(ON)} = 4.2m\Omega$  (typical) @  $V_{GS} = 10V$   
 $R_{DS(ON)} = 6.7m\Omega$  (typical) @  $V_{GS} = 4.5V$
- High density cell design for ultra low  $R_{dson}$
- Very low on-resistance  $R_{DS(on)}$
- Good stability and uniformity with high  $E_{AS}$
- 150 °C operating temperature
- Pb-free lead plating

### DFN 3.3X3.3



Top View

Bottom View



Schematic Diagram

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE3065Q	NCE3065Q	DFN 3.3X3.3-8L	-	-	-

### Absolute Maximum Ratings ( $T_C = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	65	A
Drain Current-Continuous( $T_C = 100^\circ C$ )	$I_D(100^\circ C)$	46	A
Pulsed Drain Current (Note 1)	$I_{DM}$	260	A
Maximum Power Dissipation	$P_D$	45	W
Derating factor		0.36	W/ $^\circ C$
Single pulse avalanche energy (Note 5)	$E_{AS}$	150	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Case (Note 2)	$R_{\theta JC}$	2.8	$^\circ C/W$
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## Electrical Characteristics (TC=25°C unless otherwise noted)

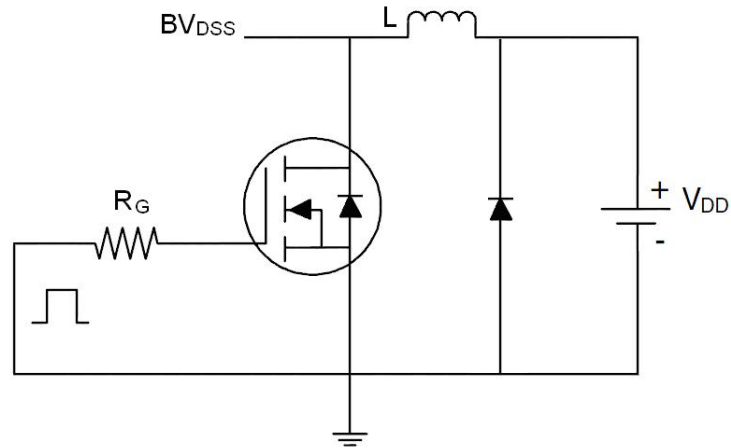
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics (Note 3)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.5	2.2	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$	-	4.2	5.5	m $\Omega$
		$V_{GS}=4.5V, I_D=20A$	-	6.7	8.0	
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=20A$	30	-	-	S
<b>Dynamic Characteristics (Note4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$	-	1784	-	PF
Output Capacitance	$C_{oss}$		-	266	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	212	-	PF
<b>Switching Characteristics (Note 4)</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=5V, I_D=20A$ $V_{GS}=10V, R_{GEN}=6\Omega$	-	7	-	nS
Turn-on Rise Time	$t_r$		-	6	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	30	-	nS
Turn-Off Fall Time	$t_f$		-	8	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=15V, I_D=20A,$ $V_{GS}=10V$	-	38.4	-	nC
Gate-Source Charge	$Q_{gs}$		-	5.8	-	nC
Gate-Drain Charge	$Q_{gd}$		-	7.9	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=20A$	-	0.85	1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	65	A
Reverse Recovery Time	$t_{rr}$	$T_J = 25^\circ C, I_F = 20A$ $di/dt = 100A/\mu s$ (Note3)	-	-	47	nS
Reverse Recovery Charge	$Q_{rr}$		-	-	25	nC
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

### Notes:

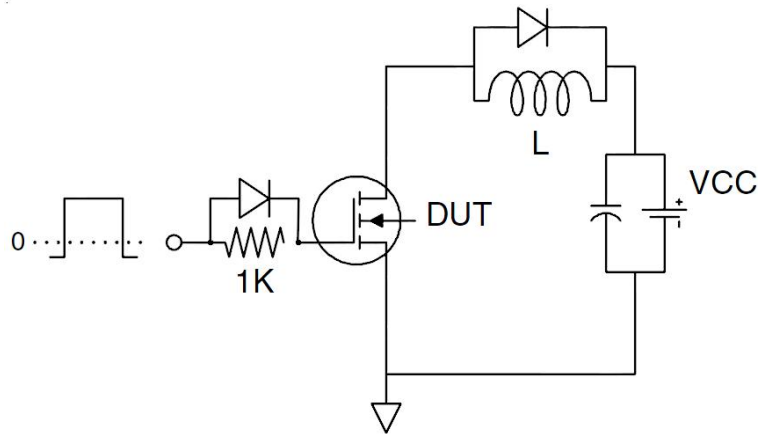
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5. EAS condition:  $T_J=25^\circ C, V_{DD}=15V, V_G=10V, L=0.5mH, R_g=25\Omega$

## Test Circuit

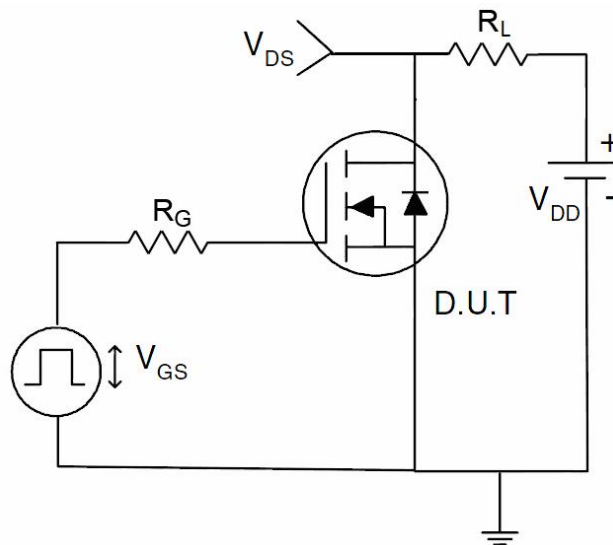
### 1) E<sub>AS</sub> Test Circuits



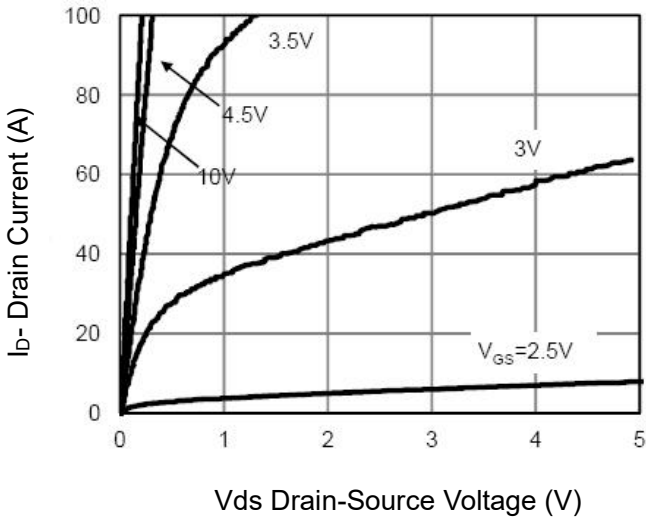
### 2) Gate Charge Test Circuit



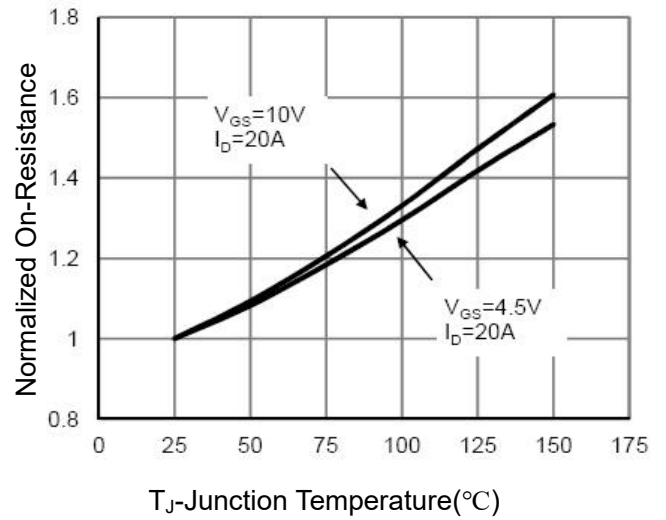
### 3) Switch Time Test Circuit



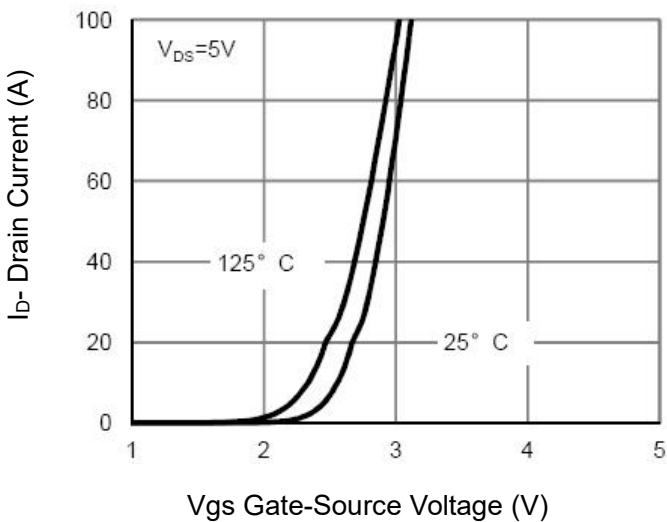
**Typical Electrical and Thermal Characteristics (Curves)**



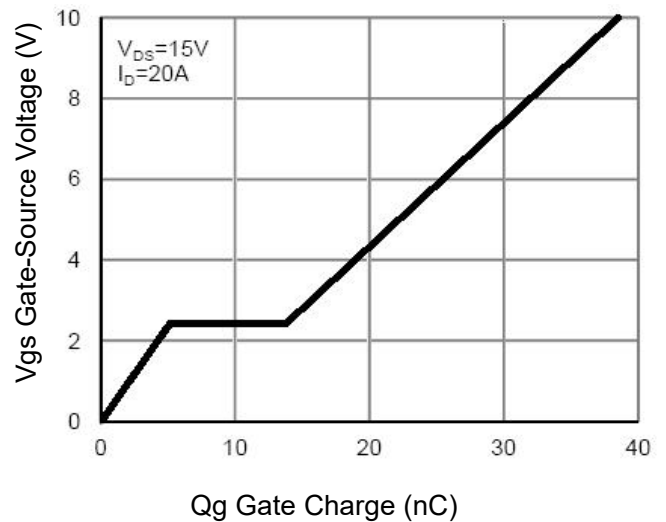
**Figure 1 Output Characteristics**



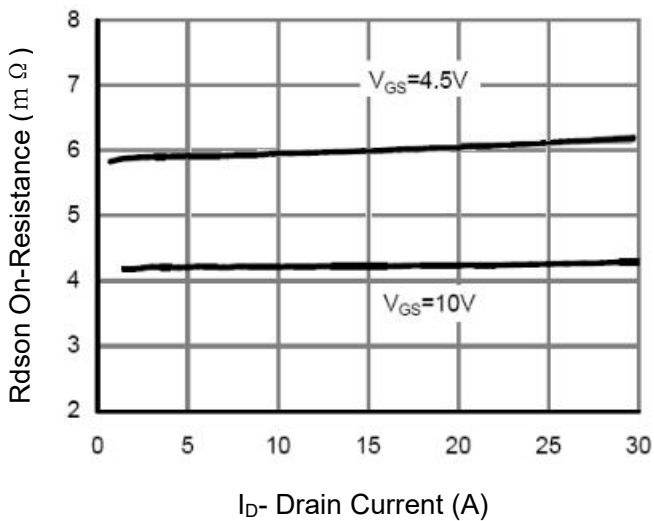
**Figure 4 Rdson-Junction Temperature**



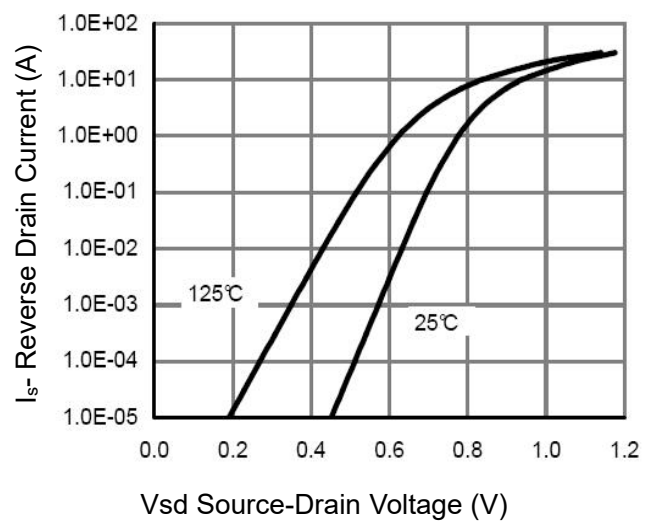
**Figure 2 Transfer Characteristics**



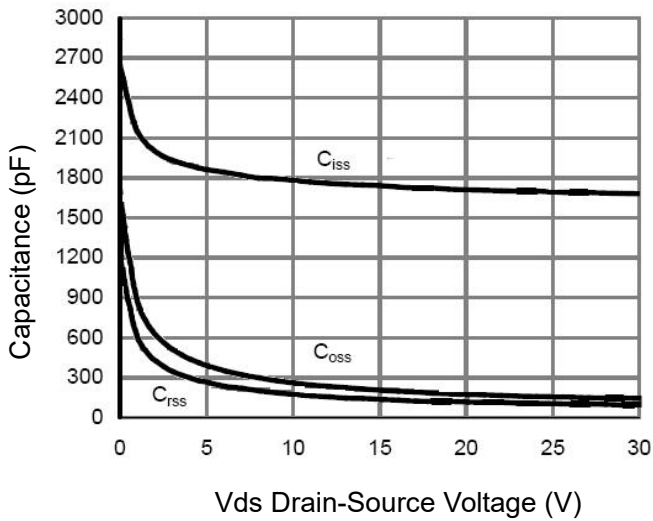
**Figure 5 Gate Charge**



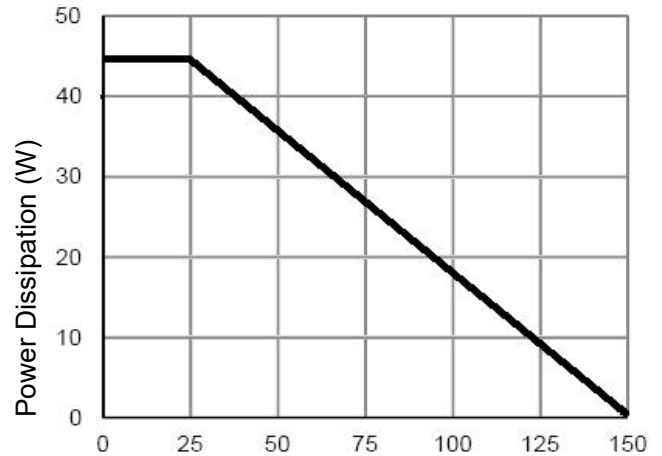
**Figure 3 Rdson- Drain Current**



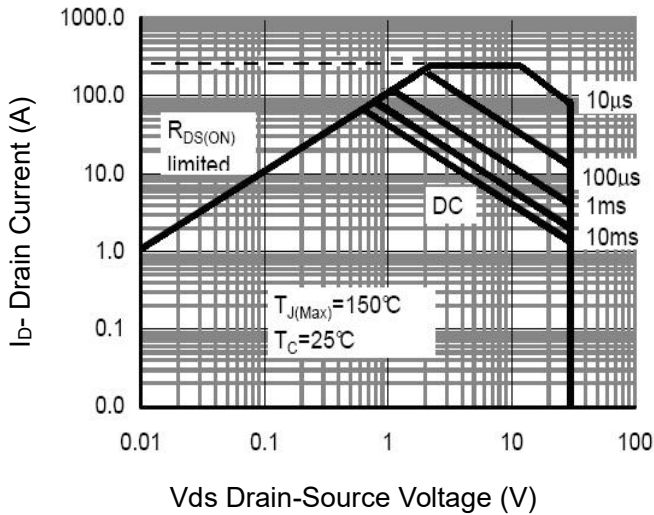
**Figure 6 Source- Drain Diode Forward**



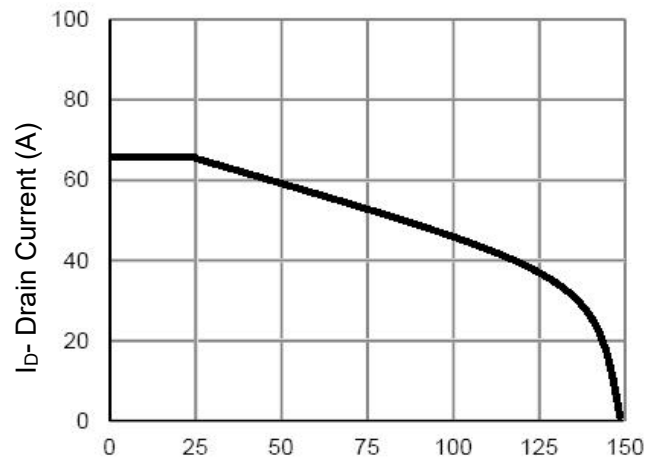
Vds Drain-Source Voltage (V)  
**Figure 7 Capacitance vs Vds**



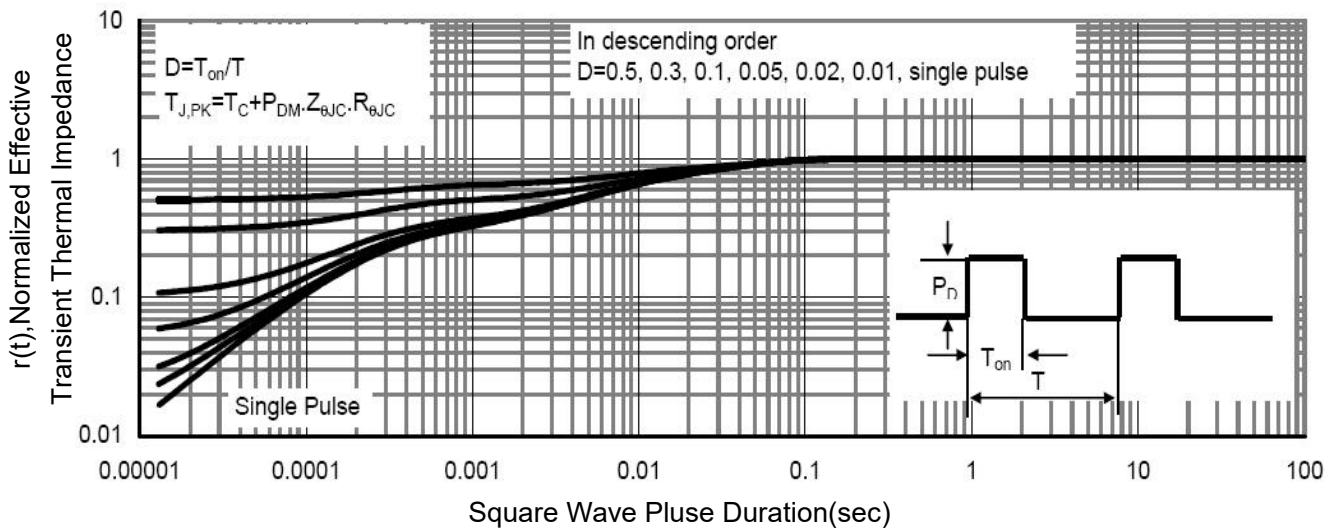
T<sub>J</sub>-Junction Temperature(°C)  
**Figure 9 Power De-rating**



Vds Drain-Source Voltage (V)  
**Figure 8 Safe Operation Area**

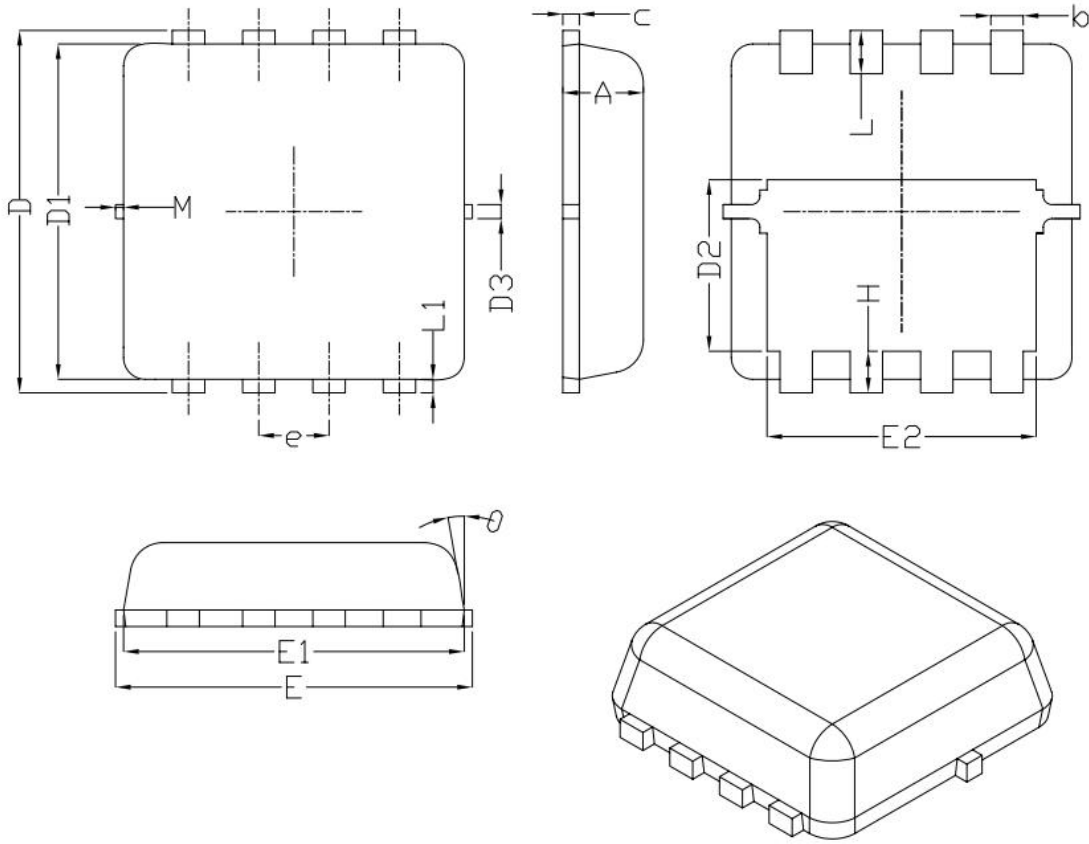


T<sub>J</sub>-Junction Temperature(°C)  
**Figure 10 Current De-rating**



**Figure 11 Normalized Maximum Transient Thermal Impedance**

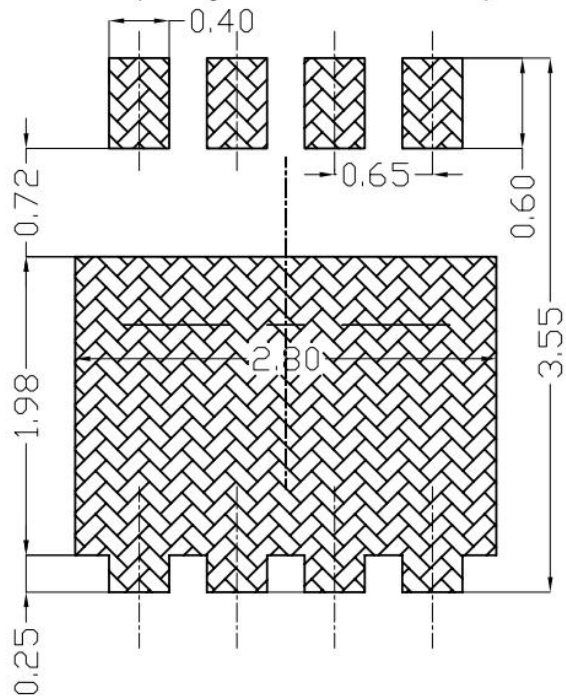
DFN3.3X3.3 Package Information



SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.48	1.58	1.68
D3	---	0.13	---
E	3.20	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	---	0.13	---
θ	---	10°	12°
M	*	*	0.15

\* Not specified

Land Pattern  
(Only for Reference)



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