

NCE P-Channel Enhancement Mode Power MOSFET

Description

The NCE40P20Q uses advanced trench technology to provide excellent $R_{DS(ON)}$. This device is suitable for use as a load switch or power management.

Application

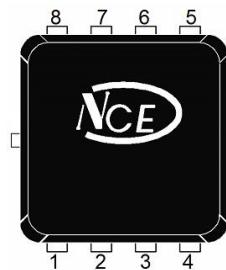
- Power management
- Load switch

100% UIS TESTED!
100% ΔV_{ds} TESTED!

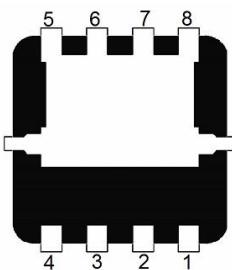
General Features

- $V_{DS} = -40V, I_D = -20A$
- $R_{DS(ON)} < 18m\Omega @ V_{GS} = -10V$
- $R_{DS(ON)} < 28m\Omega @ V_{GS} = -4.5V$
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

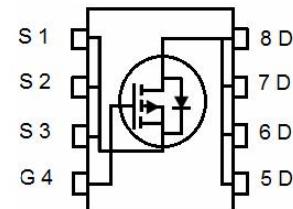
DFN 3.3X3.3



Top View



Bottom View



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE40P20Q	NCE40P20Q	DFN3.3X3.3-8L			

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-20	A
Drain Current-Pulsed (Note 1)	I_{DM}	-80	A
Maximum Power Dissipation	P_D	30	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Case (Note 2)	R_{eJC}	4.17	°C/W
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Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{\text{GS}}=0\text{V}, I_{\text{D}}=-250\mu\text{A}$	-40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{DS}}=-40\text{V}, V_{\text{GS}}=0\text{V}$	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{\text{GS}}=\pm 20\text{V}, V_{\text{DS}}=0\text{V}$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{\text{GS(th)}}$	$V_{\text{DS}}=V_{\text{GS}}, I_{\text{D}}=-250\mu\text{A}$	-1.2	-1.8	-2.4	V
Drain-Source On-State Resistance	$R_{\text{DS(ON)}}$	$V_{\text{GS}}=-10\text{V}, I_{\text{D}}=-20\text{A}$	-	14	18	$\text{m}\Omega$
	$R_{\text{DS(ON)}}$	$V_{\text{GS}}=-4.5\text{V}, I_{\text{D}}=-20\text{A}$	-	21.5	28	
Forward Transconductance	g_{FS}	$V_{\text{DS}}=-10\text{V}, I_{\text{D}}=-20\text{A}$	-	25	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{\text{DS}}=-20\text{V}, V_{\text{GS}}=0\text{V}, F=1.0\text{MHz}$	-	2800	-	PF
Output Capacitance	C_{oss}		-	300	-	PF
Reverse Transfer Capacitance	C_{rss}		-	275	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{\text{d(on)}}$	$V_{\text{DD}}=-20\text{V}, I_{\text{D}}=-20\text{A}, V_{\text{GS}}=-10\text{V}, R_{\text{GEN}}=3\Omega$	-	11	-	nS
Turn-on Rise Time	t_r		-	9.4	-	nS
Turn-Off Delay Time	$t_{\text{d(off)}}$		-	24	-	nS
Turn-Off Fall Time	t_f		-	12	-	nS
Total Gate Charge	Q_g	$V_{\text{DS}}=-20\text{V}, I_{\text{D}}=-20\text{A}, V_{\text{GS}}=-10\text{V}$	-	54	-	nC
Gate-Source Charge	Q_{gs}		-	8	-	nC
Gate-Drain Charge	Q_{gd}		-	11	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{\text{GS}}=0\text{V}, I_{\text{S}}=-20\text{A}$	-	-	-1.2	V

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 $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics

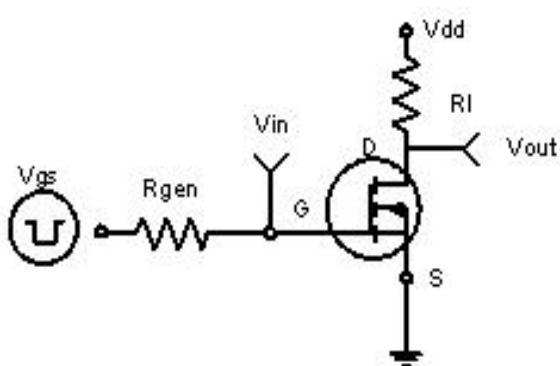


Figure 1 Switching Test Circuit

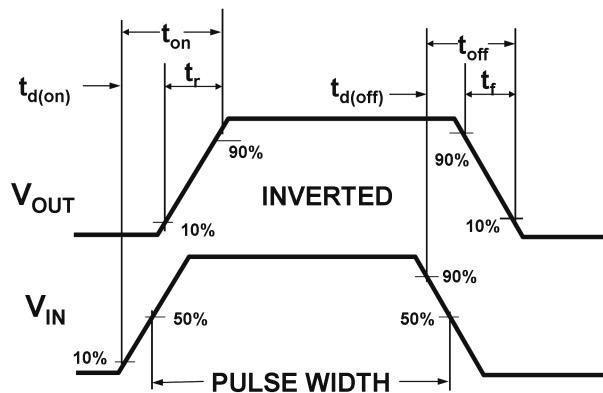


Figure 2 Switching Waveforms

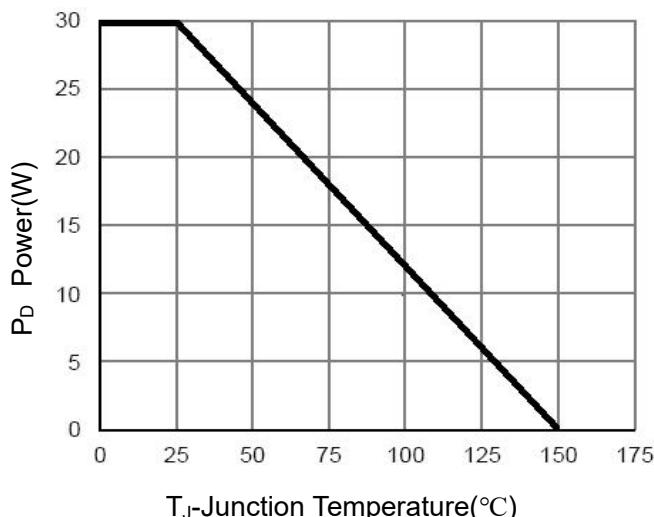


Figure 3 Power Dissipation

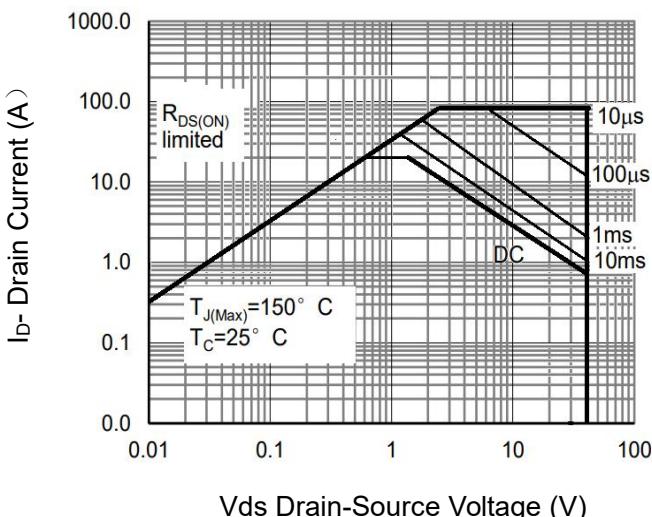


Figure 4 Safe Operation Area

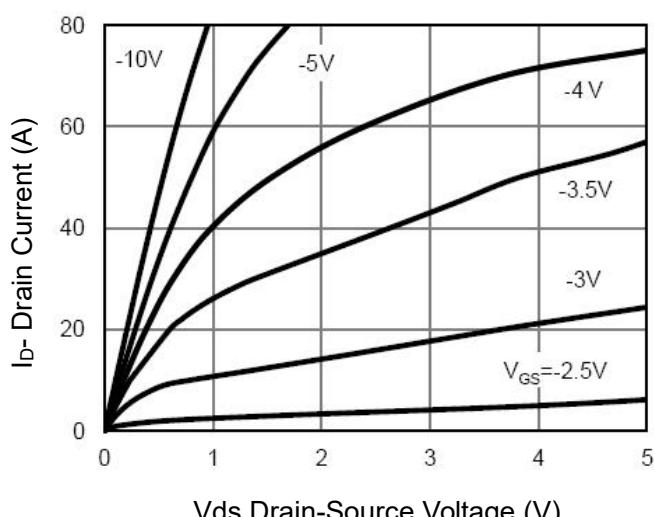


Figure 5 Output Characteristics

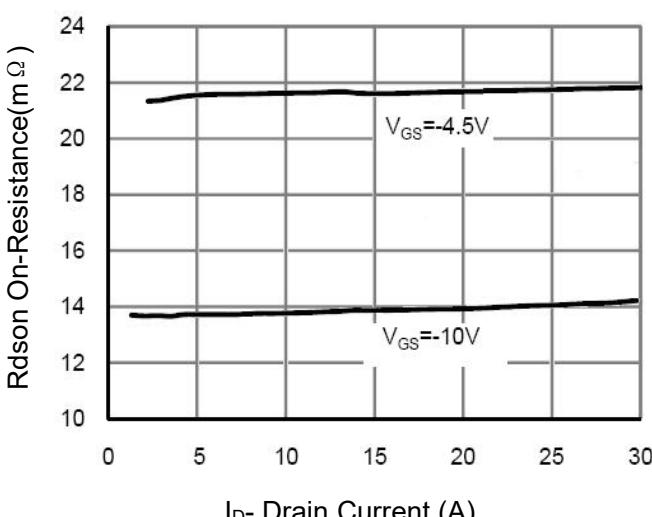


Figure 6 Drain-Source On-Resistance

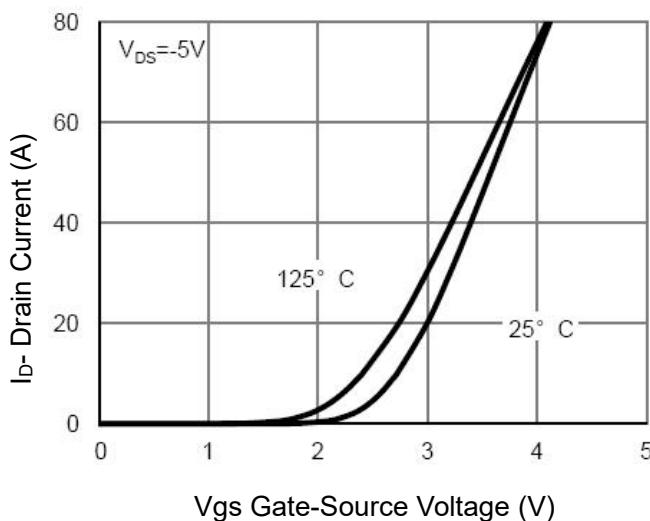


Figure 7 Transfer Characteristics

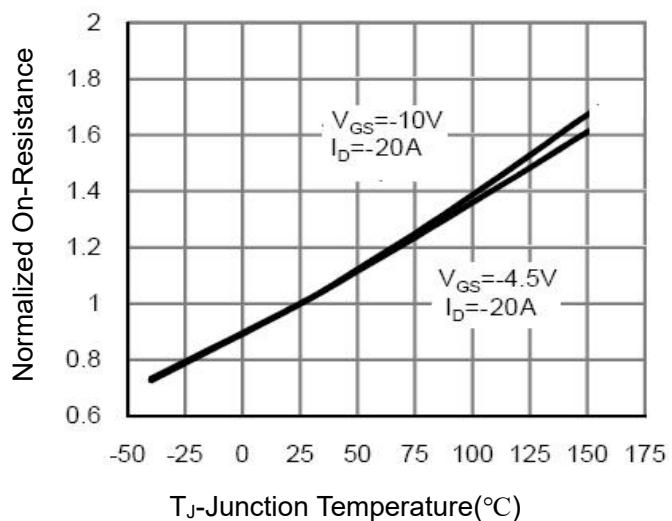


Figure 8 Drain-Source On-Resistance

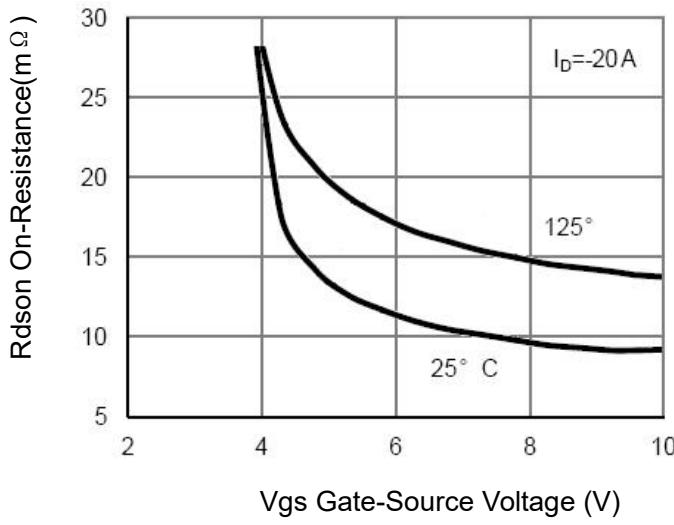


Figure 9 $R_{DS(on)}$ vs V_{GS}

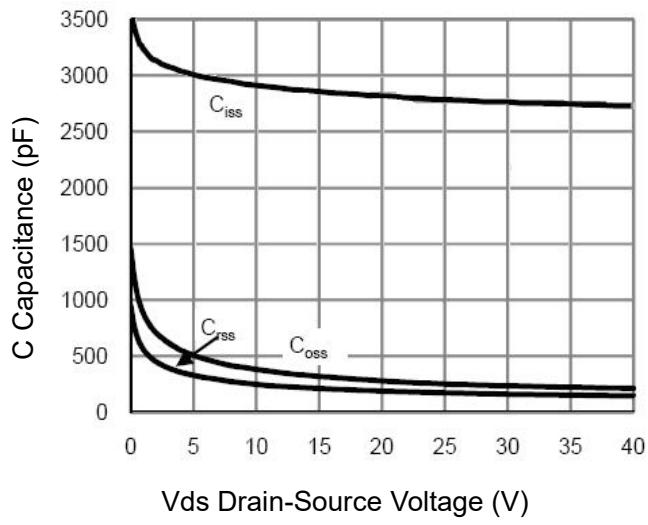


Figure 10 Capacitance vs V_{DS}

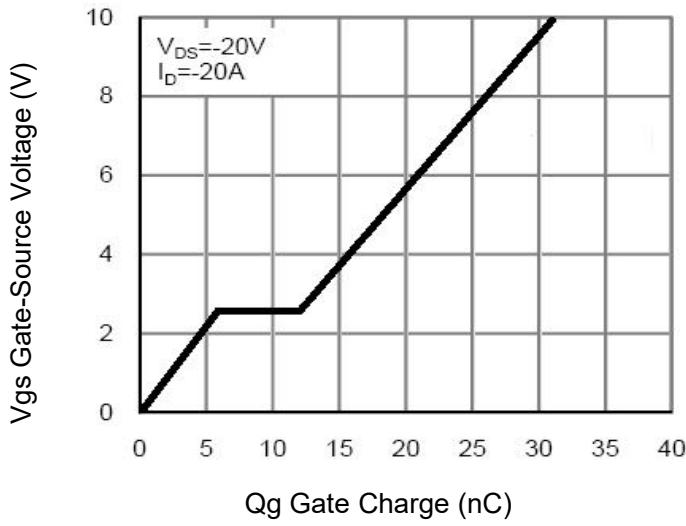


Figure 11 Gate Charge

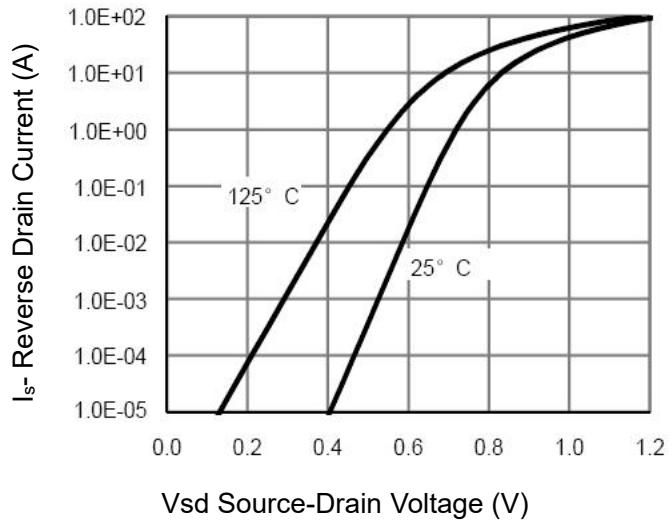


Figure 12 Source- Drain Diode Forward

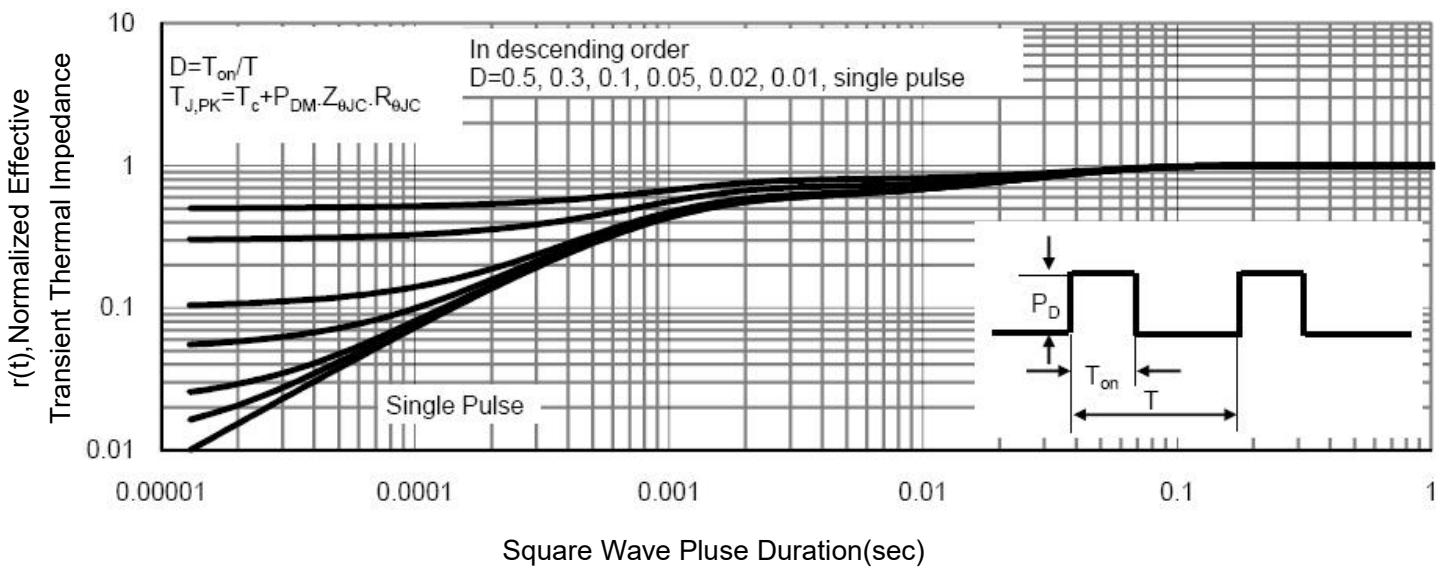
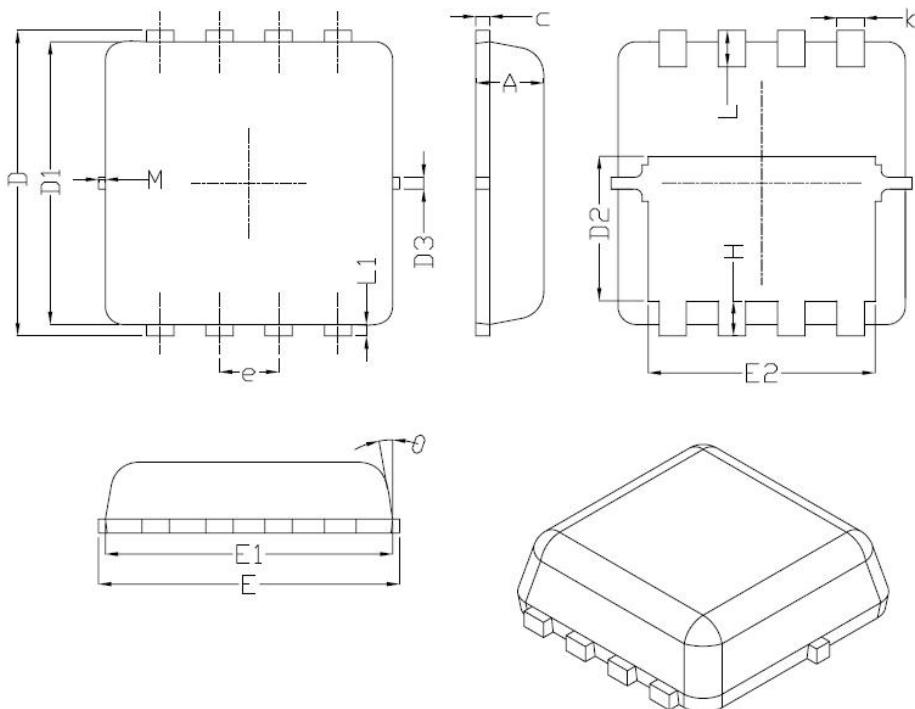
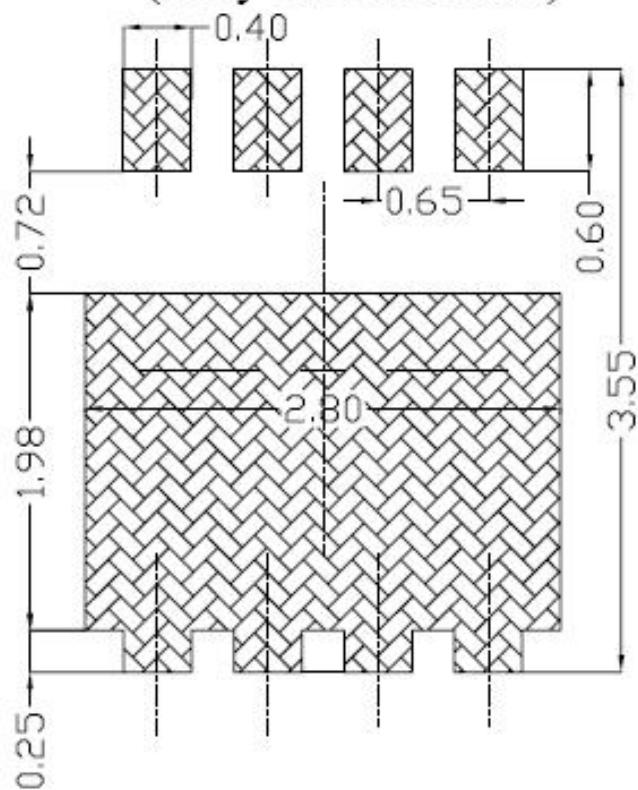


Figure 13 Normalized Maximum Transient Thermal Impedance

DFN3.3X3.3-8L Package Information


Symbol	Dimensions In Millimeters		
	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	-
M	*	*	0.15
θ		10°	12°

Land Pattern
(Only for Reference)



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