NCE N-Channel Enhancement Mode Power MOSFET

Description

he NCE6020AQ 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

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

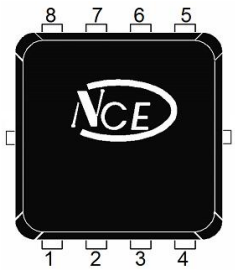
General Features

- V_{DS} = 60V,I_D = 20A
  $R_{DS(ON)}$ <23mΩ @ V_{GS}=10V
  $R_{DS(ON)}$ <30mΩ @ V_{GS}=4.5V
- High power and current handing capability
- Fully characterized avalanche voltage and current
- Lead free product is acquired
- Surface mount package

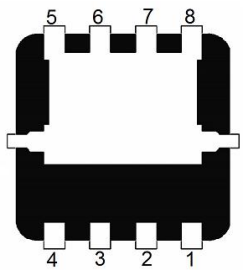
100% UIS TESTED!

100% ΔVds TESTED!

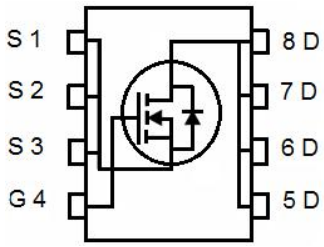
DFN 3.3X3.3



Top View



Bottom View



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE6020AQ	NCE6020AQ	DFN3.3X3.-8L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	20	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	14	A
Pulsed Drain Current(Note 1)	I_{DM}	60	A
Maximum Power Dissipation	P_D	20	W
Single pulse avalanche energy (Note 5)	E_{AS}	72	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case(Note 2)	$R_{\theta JC}$	6.3	℃/W

Electrical Characteristics (T_A=25℃unless otherwise noted)

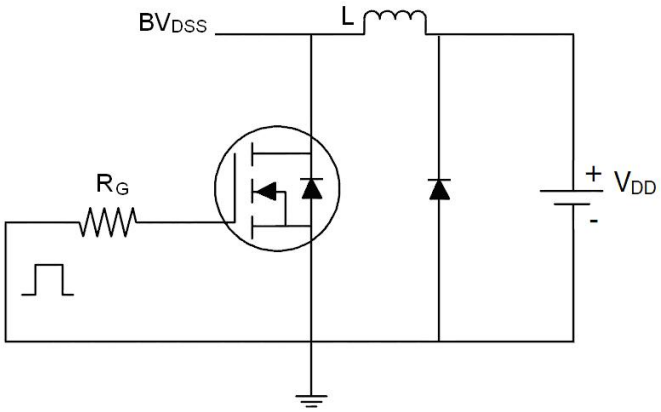
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1.2	1.6	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=10A	-	20	23	mΩ
		V_{GS}=4.5V, I_D=10A		25	30	
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=10A	11	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=30V,V_{GS}=0V, F=1.0MHz	-	973.2	-	PF
Output Capacitance	C_{oss}		-	61.2	-	PF
Reverse Transfer Capacitance	C_{rss}		-	58.8	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V,R_L=3Ω V_{GS}=10V,R_G=3Ω	-	7	-	nS
Turn-on Rise Time	t_r		-	20	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	16	-	nS
Turn-Off Fall Time	t_f		-	23	-	nS
Total Gate Charge	Q_g	V_{DS}=30V,I_D=10A, V_{GS}=10V	-	25		nC
Gate-Source Charge	Q_{gs}		-	4.5		nC
Gate-Drain Charge	Q_{gd}		-	6.5		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=10A	-		1.2	V
Diode Forward Current (Note 2)	I_S		-	-	20	A
Reverse Recovery Time	t_{rr}	TJ = 25°C, IF =10A di/dt = 100A/μs (Note3)	-	29	-	nS
Reverse Recovery Charge	Qrr		-	49	-	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

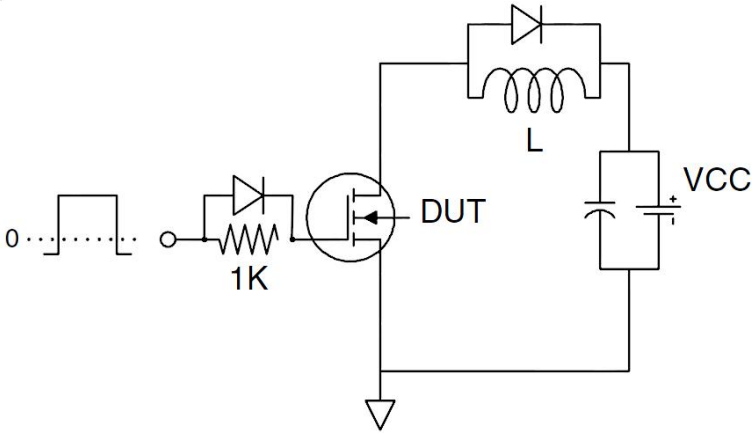
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition:Tj=25℃,V_{DD}=30V,V_G=10V,L=0.5mH,Rg=25Ω

Test Circuit

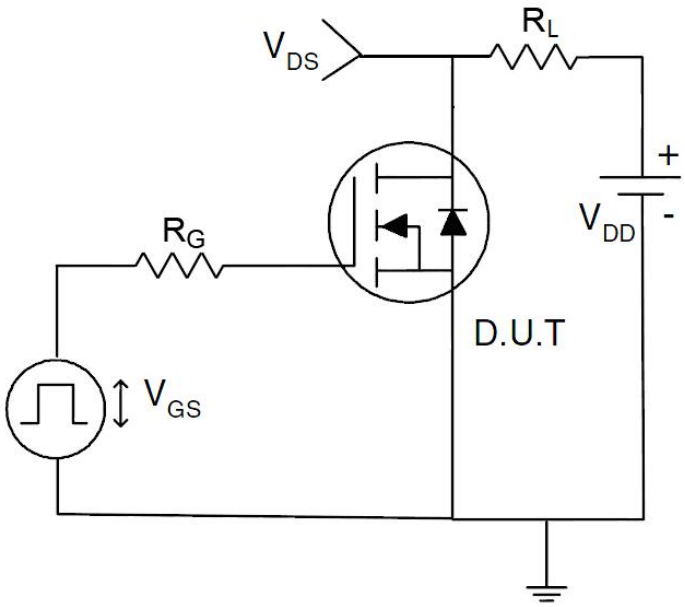
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

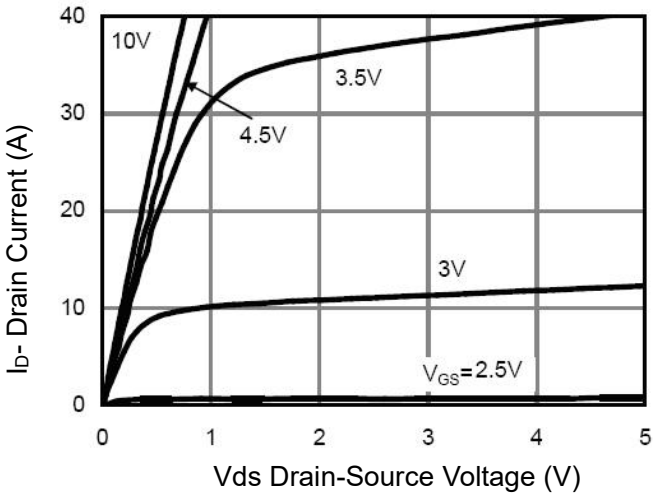


Figure 1 Output Characteristics

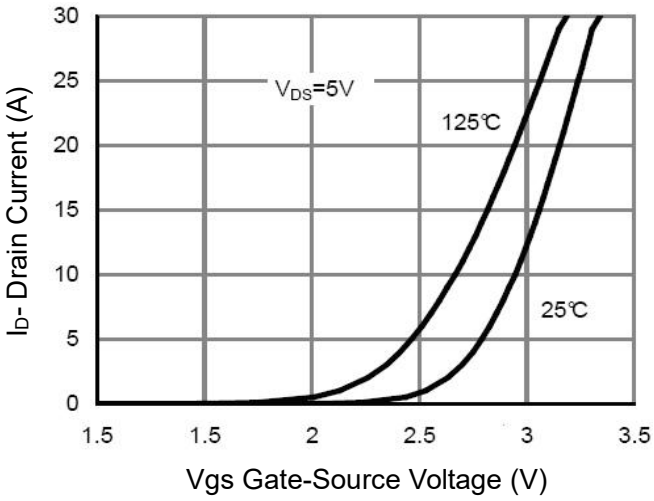


Figure 2 Transfer Characteristics

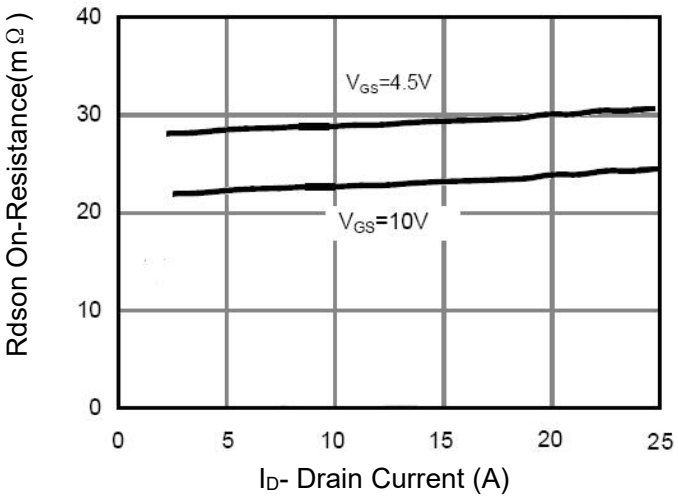


Figure 3 Rdson- Drain Current

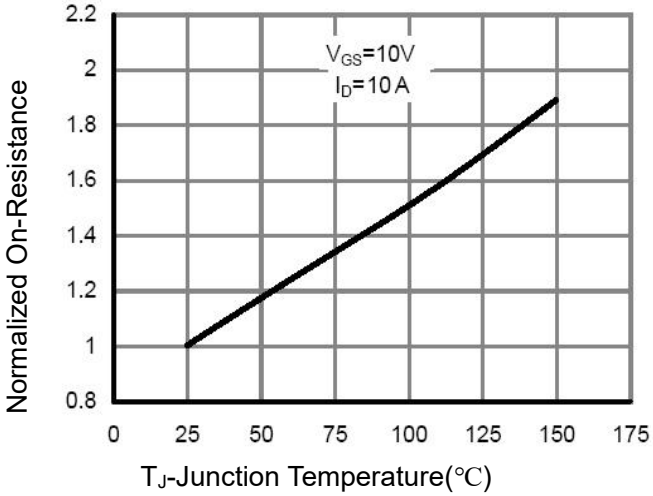


Figure 4 Rdson-Junction Temperature

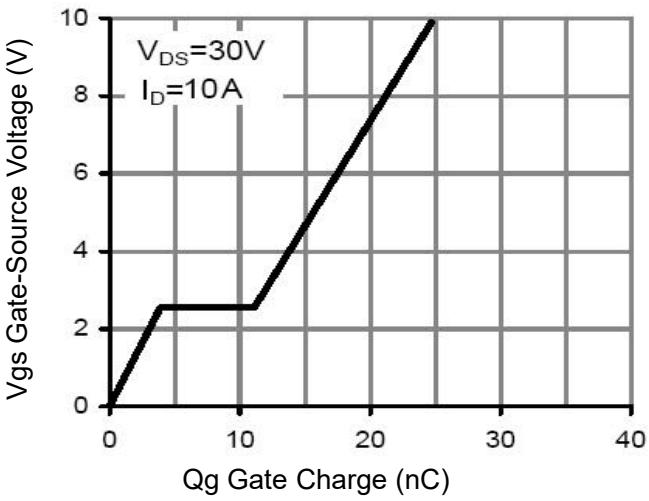


Figure 5 Gate Charge

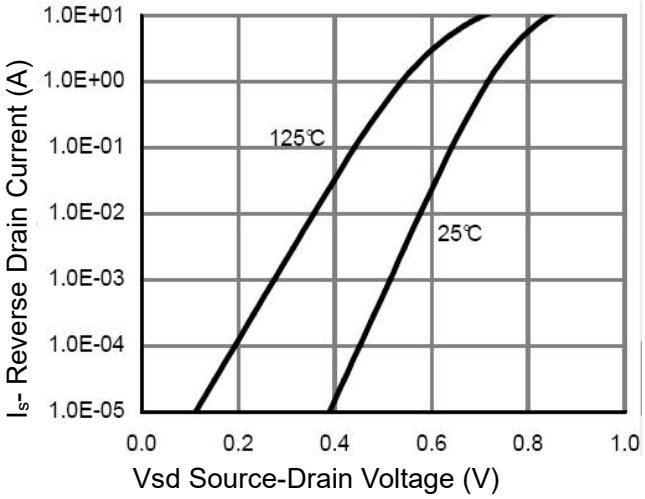


Figure 6 Source- Drain Diode Forward

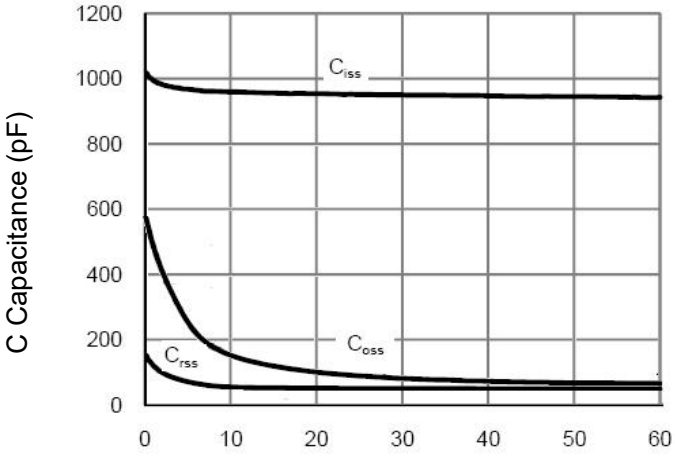


Figure 7 Capacitance vs Vds

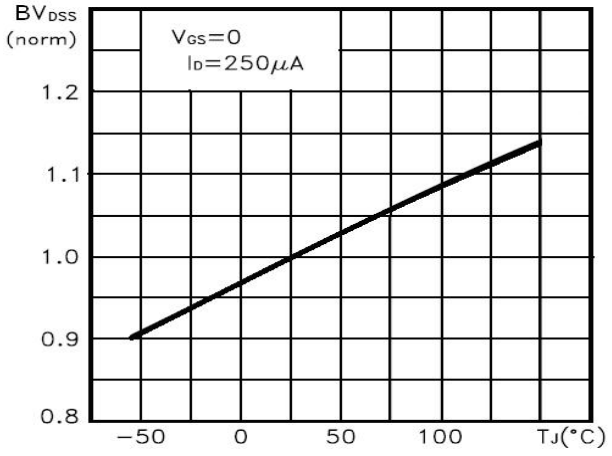


Figure 9 BV_{DSS} vs Junction Temperature

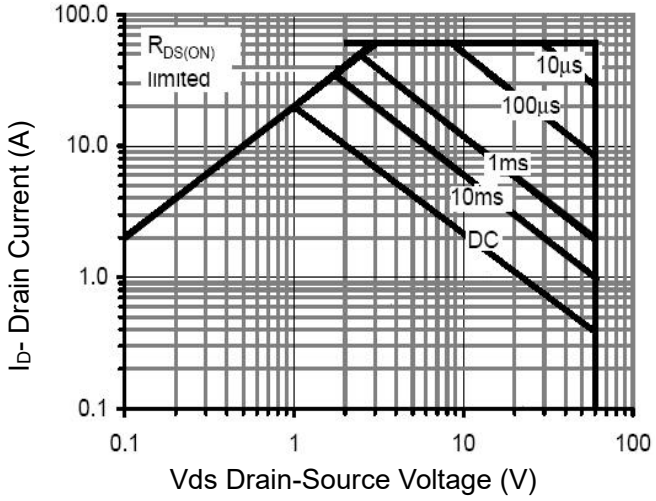


Figure 8 Safe Operation Area

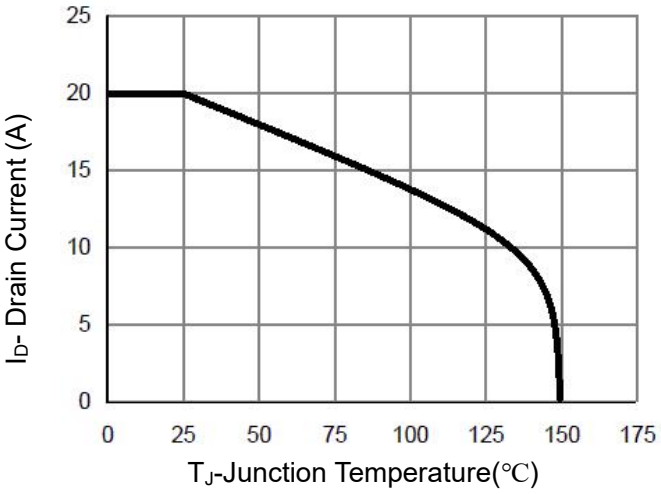


Figure 10 Current De-rating

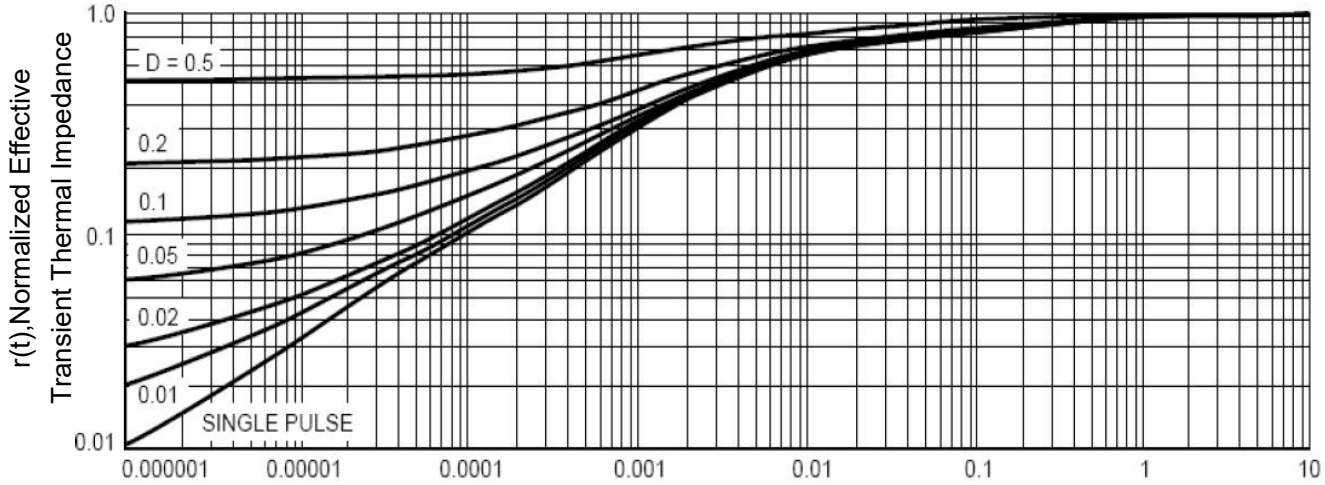
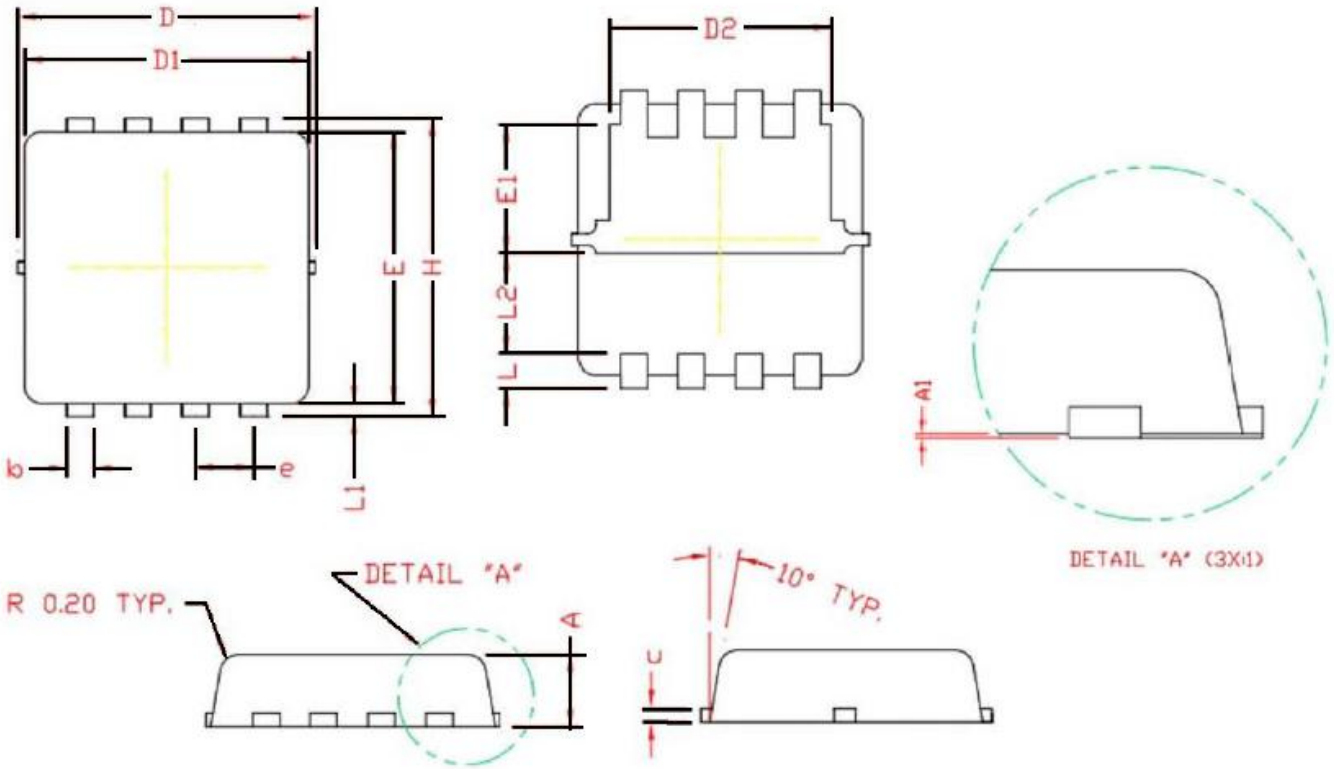


Figure 12 Normalized Maximum Transient Thermal Impedance

DFN3.3X3.3-8L Package Information



COMMON DIMENSIONS

(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.70	0.80	0.90
A1	0.00	0.03	0.05
b	0.24	0.30	0.35
c	0.10	0.15	0.20
D	3.25	3.32	3.40
D1	3.05	3.15	3.25
D2	2.40	2.50	2.60
E	3.00	3.10	3.20
E1	1.35	1.45	1.55
e	0.65 BSC.		
H	3.20	3.30	3.40
L	0.30	0.40	0.50
L1	0.10	0.15	0.20
L2	1.13 REF.		

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