NCE P-Channel Enhancement Mode Power MOSFET

Description

The NCE20P45Q 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

- Load switch
- Battery protection

100% UIS TESTED!

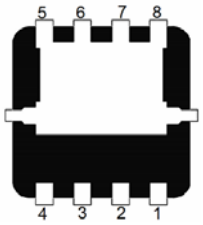
100% ΔVds TESTED!

General Features

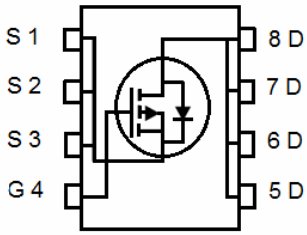
- V_{DS} =-20 V,I_D =-45A
  $R_{DS(ON)}$ < 7mΩ @ V_{GS}=-4.5V
  $R_{DS(ON)}$ < 9mΩ @ V_{GS}=-2.5V
  $R_{DS(ON)}$ < 12mΩ @ V_{GS}=-1.8V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

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
NCE20P45Q	NCE20P45Q	DFN 3.3x3.3-8L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±10	V
Drain Current-Continuous	I_D	-45	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	-35	A
Pulsed Drain Current	I_{DM}	-200	A
Maximum Power Dissipation	P_D	80	W
Single pulse avalanche energy (Note 5)	E_{AS}	320	mJ
Derating factor		0.64	W/℃
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case (Note 2)	$R_{\theta JC}$	1.6	℃/W

Electrical Characteristics (T_C=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	-20	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-16V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±10V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-0.4	-0.6	-1.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-20A	-	5.8	7	mΩ
		V_{GS}=-2.5V, I_D=-20A	-	7.2	9	
		V_{GS}=-1.8V, I_D=-20A		9	12	
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-20A	80	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=-10V,V_{GS}=0V, F=1.0MHz	-	7177	-	PF
Output Capacitance	C_{oss}		-	863	-	PF
Reverse Transfer Capacitance	C_{rss}		-	656	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-10V, R_{GEN}=3Ω V_{GS}=-4.5V,R_L=0.5Ω	-	20	-	nS
Turn-on Rise Time	t_r		-	55	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	100	-	nS
Turn-Off Fall Time	t_f		-	35	-	nS
Total Gate Charge	Q_g	V_{DS}=-10V,I_D=-20A, V_{GS}=-4.5V	-	63.5	-	nC
Gate-Source Charge	Q_{gs}		-	10	-	nC
Gate-Drain Charge	Q_{gd}		-	18	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-20A	-	-	-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-45	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = -20A di/dt = 100A/μs (Note3)	-	70	-	nS
Reverse Recovery Charge	Qrr		-	60	-	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. 5. E_{AS} condition: Tj=25℃,V_{DD}=-10V,V_G=-10V,L=0.5mH,Rg=25Ω

Typical Electrical and Thermal Characteristics (Curves)

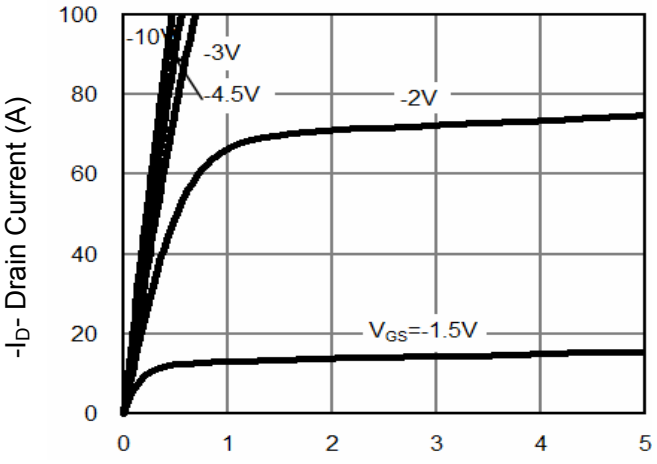


Figure 1 Output Characteristics

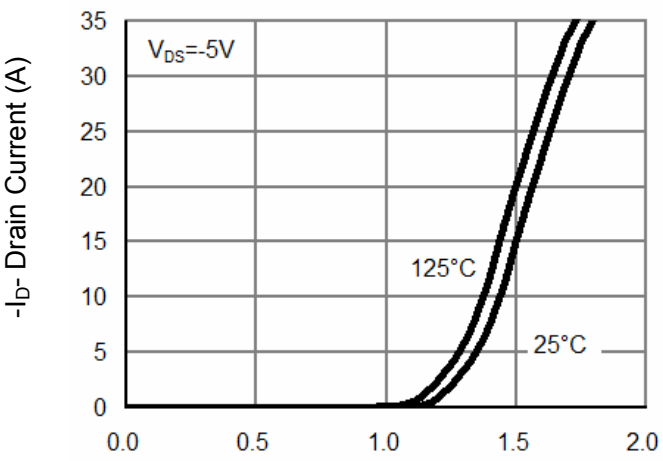


Figure 2 Transfer Characteristics

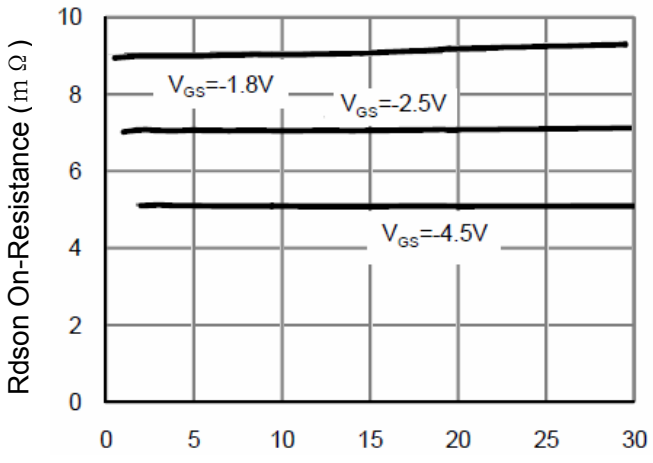


Figure 3 Rdson- Drain Current

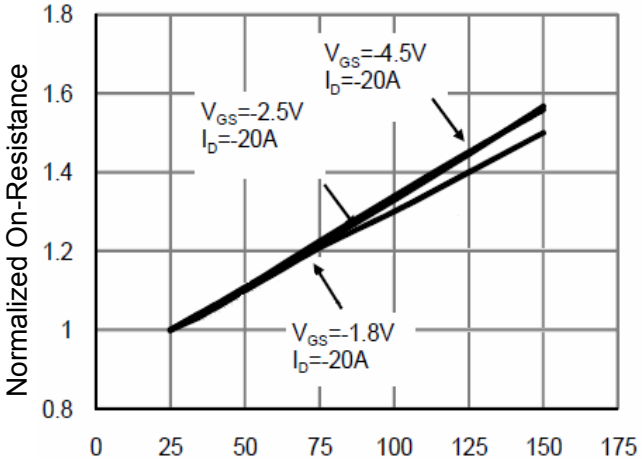


Figure 4 Rdson-Junction Temperature

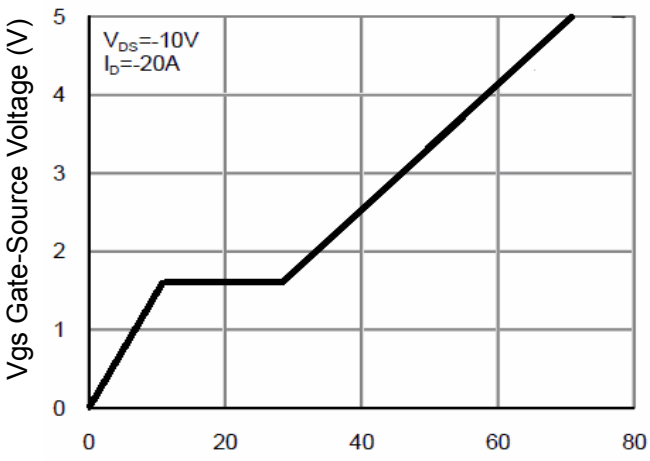


Figure 5 Gate Charge

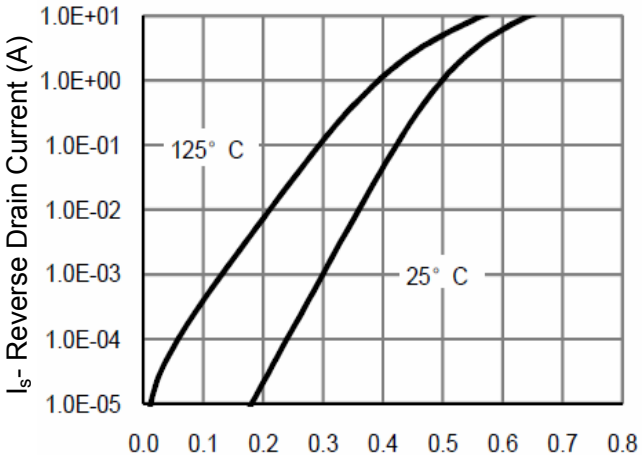
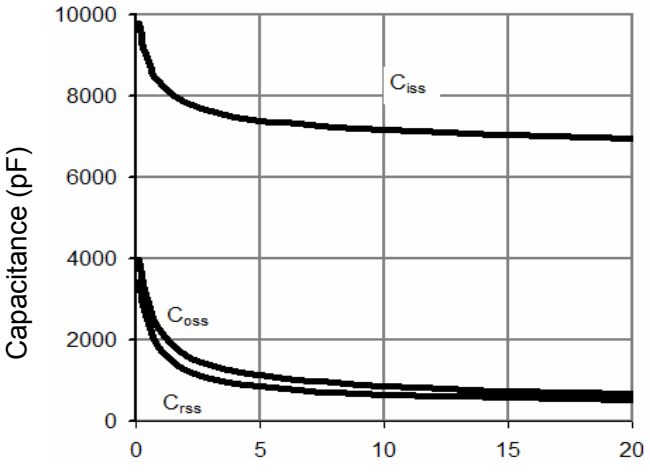
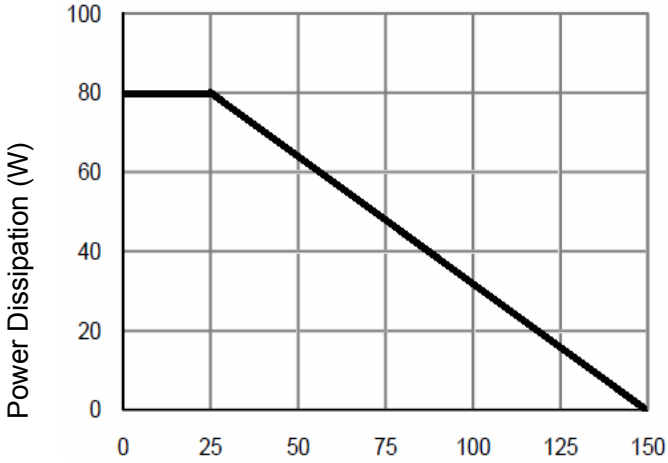


Figure 6 Source- Drain Diode Forward



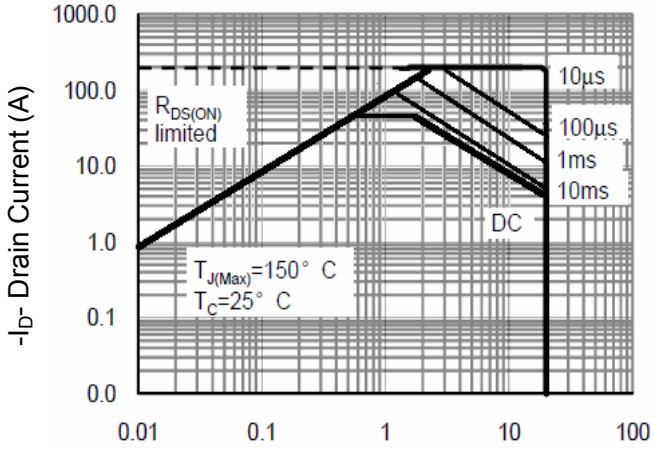
-Vds Drain-Source Voltage (V)

Figure 7 Capacitance vs Vds



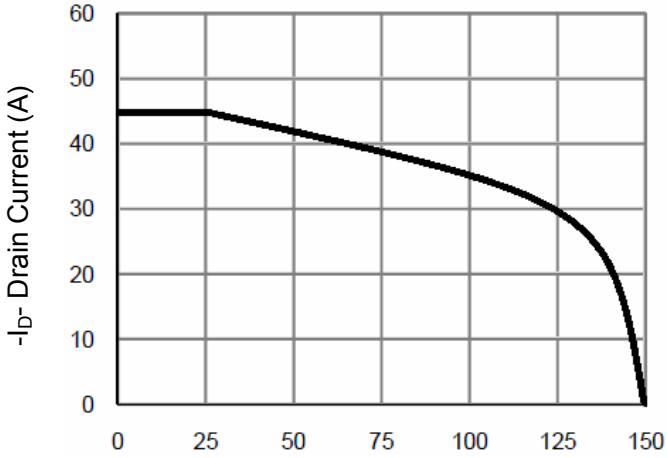
T_C-Case Temperature(℃)

Figure 9 Power De-rating



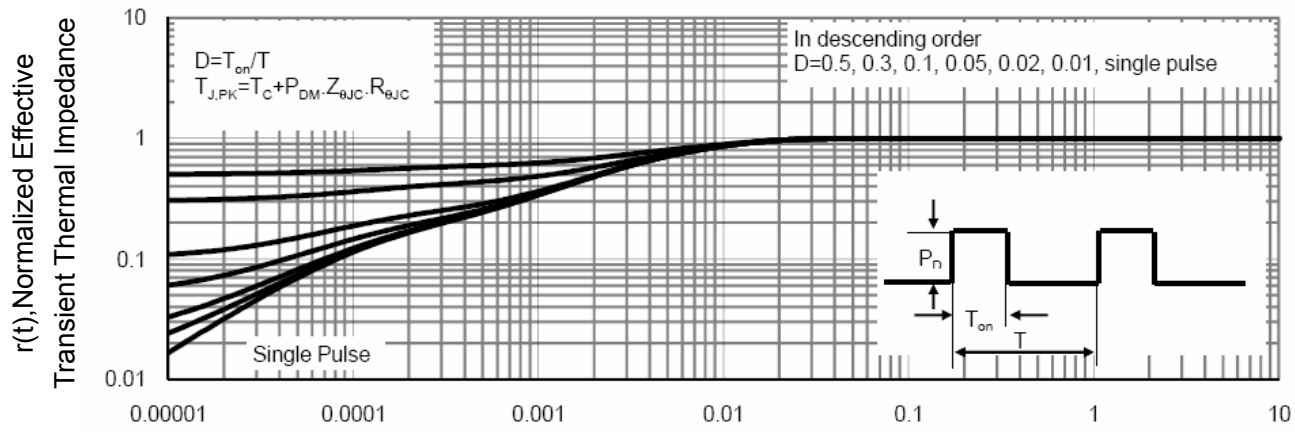
-Vds Drain-Source Voltage (V)

Figure 8 Safe Operation Area



T_C-Case Temperature(℃)

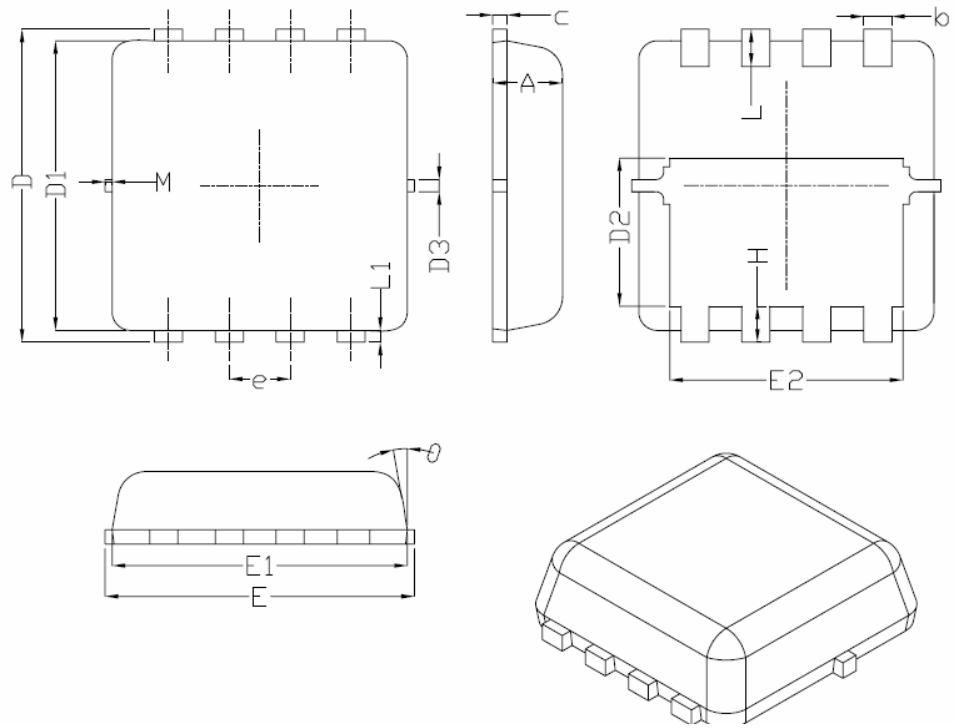
Figure 10 Current De-rating



Square Wave Pluse Duration(sec)

Figure 11 Normalized Maximum Transient Thermal Impedance

DFN3.3X3.3 EP 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			

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