NCE P-Channel Enhancement Mode Power MOSFET

Description

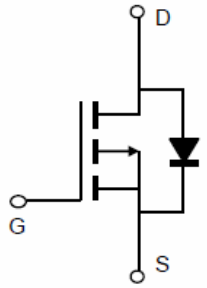
The NCE30P20Q uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge . This device is suitable for use as a load switch or in PWM applications.

General Features

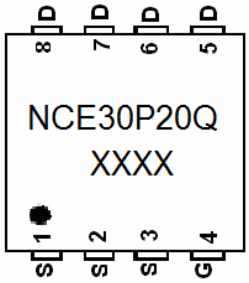
- V_{DS} = -30V,I_D = -20A
  $R_{DS(ON)}$ < 25mΩ @ V_{GS}=-4.5V
  $R_{DS(ON)}$ < 15mΩ @ V_{GS}=-10V
- High Power and current handing capability
- Lead free product is acquired
- Surface mount package

Application

- PWM applications
- Load switch
- Power management



Schematic diagram



Marking and pin assignment

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE30P20Q	NCE30P20Q	DFN3.3X3.3	Ø330mm	12mm	2500 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	-20	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	-14.1	A
Drain Current-Pulsed (Note 1)	I_{DM}	-80	A
Maximum Power Dissipation	P_D	35	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case (Note 2)	$R_{\theta JC}$	3.57	℃/W

Electrical Characteristics (T_A=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=-250μA	-30	-33	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-30V,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	-1.5	-1.9	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-15A	-	11.5	15	mΩ
		V_{GS}=-4.5V, I_D=-15A	-	18	25	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-15A	15	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=-25V,V_{GS}=0V, F=1.0MHz	-	2130	-	PF
Output Capacitance	C_{oss}		-	302	-	PF
Reverse Transfer Capacitance	C_{rss}		-	227	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-15V, ID=-15A, V_{GS}=-10V,R_{GEN}=1Ω	-	12	-	nS
Turn-on Rise Time	t_r		-	10	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	25	-	nS
Turn-Off Fall Time	t_f		-	13	-	nS
Total Gate Charge	Q_g	V_{DS}=-15V,I_D=-20A,V_{GS}=-10V	-	45.6	-	nC
Gate-Source Charge	Q_{gs}		-	4.6	-	nC
Gate-Drain Charge	Q_{gd}		-	11.1	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-20A	-	-	-1.2	V

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

Typical Electrical and Thermal Characteristics

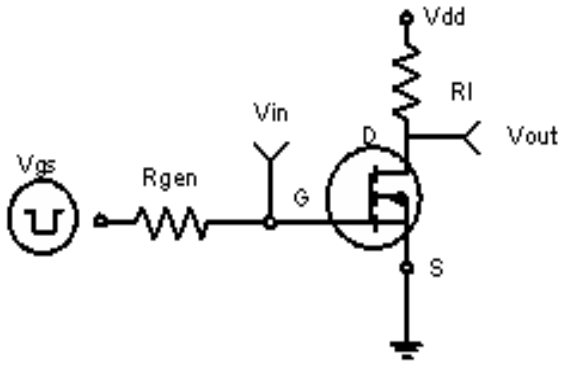


Figure 1:Switching Test Circuit

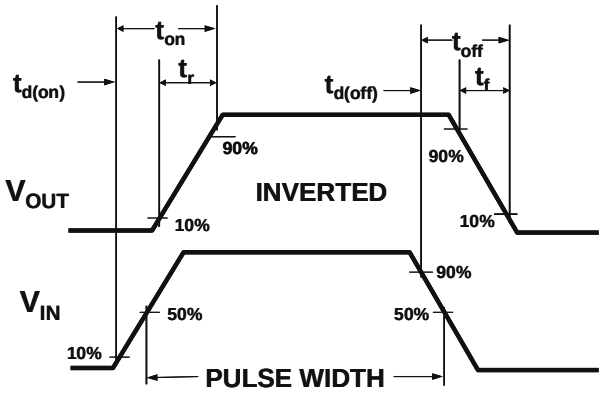


Figure 2:Switching Waveforms

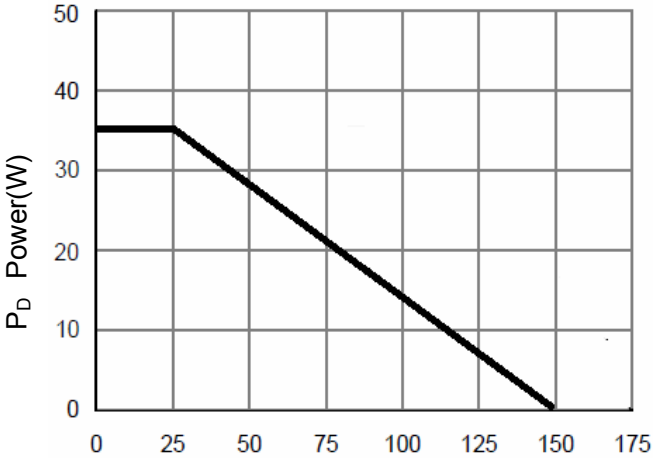


Figure 3 Power Dissipation

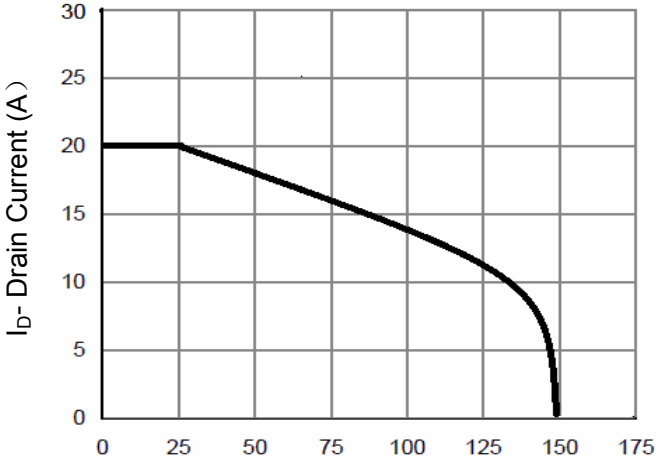


Figure 4 Drain Current

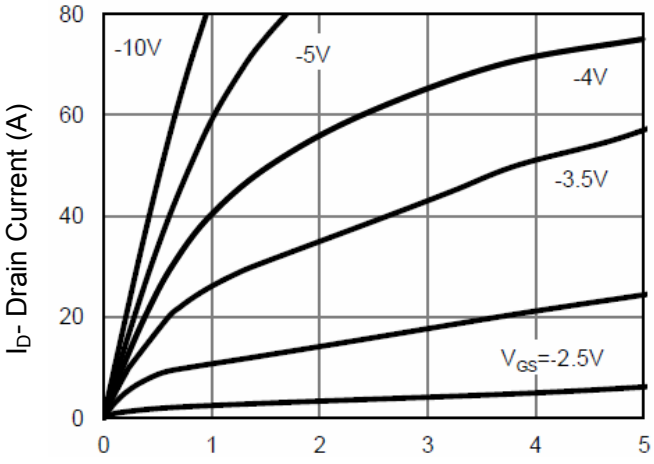


Figure 5 Output Characteristics

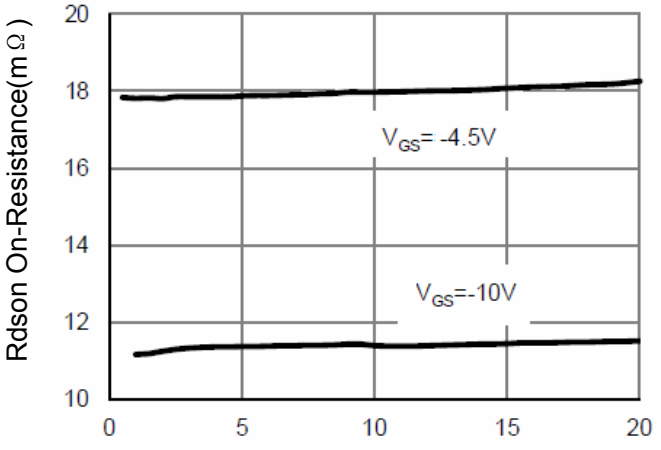


Figure 6 Drain-Source On-Resistance

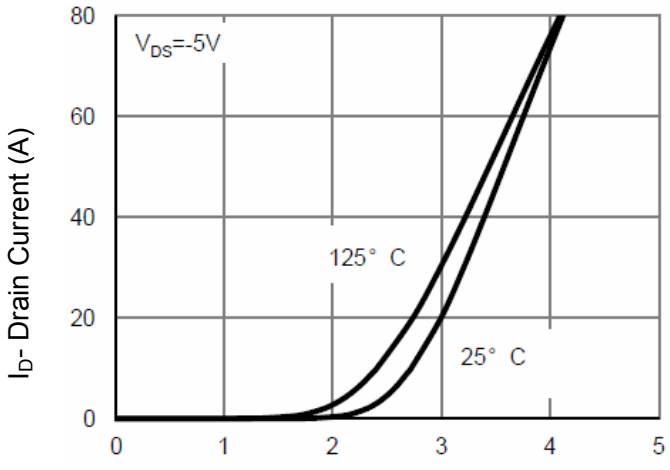


Figure 7 Transfer Characteristics

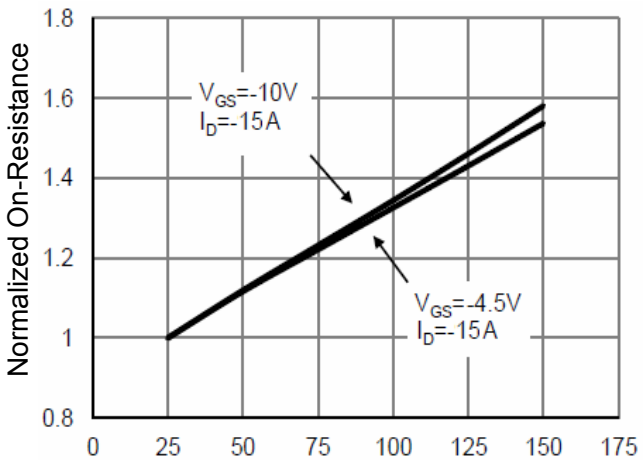


Figure 8 Drain-Source On-Resistance

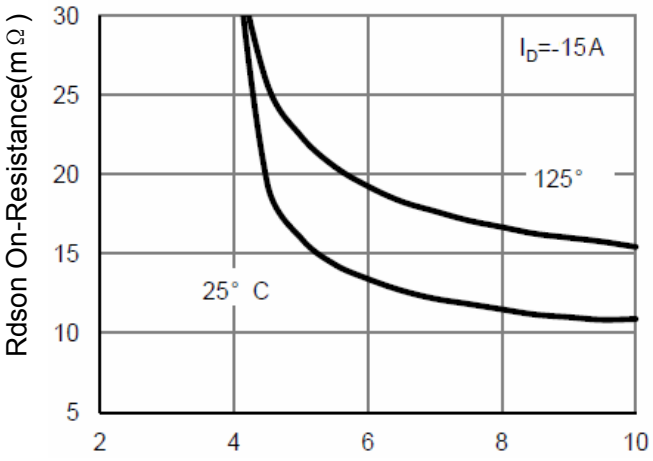


Figure 9 Rdson vs Vgs

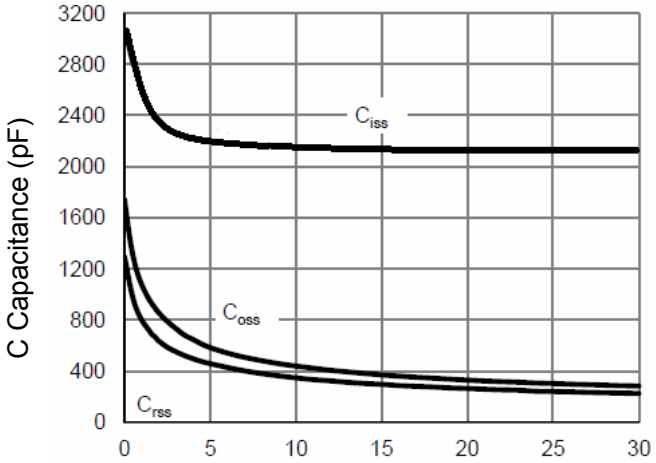


Figure 10 Capacitance vs Vds

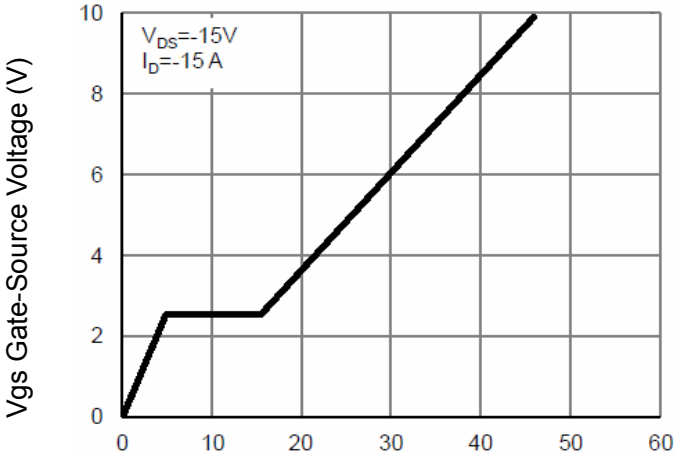


Figure 11 Gate Charge

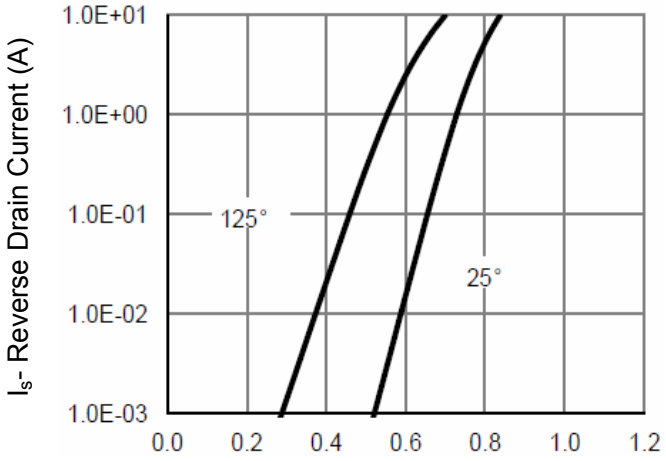


Figure 12 Source- Drain Diode Forward

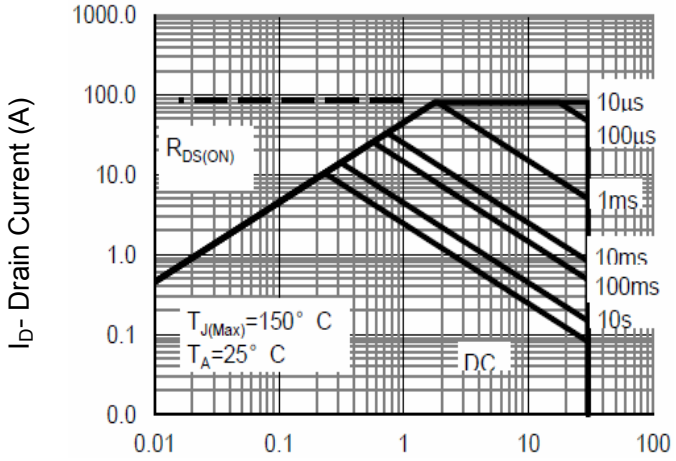


Figure 13 Safe Operation Area

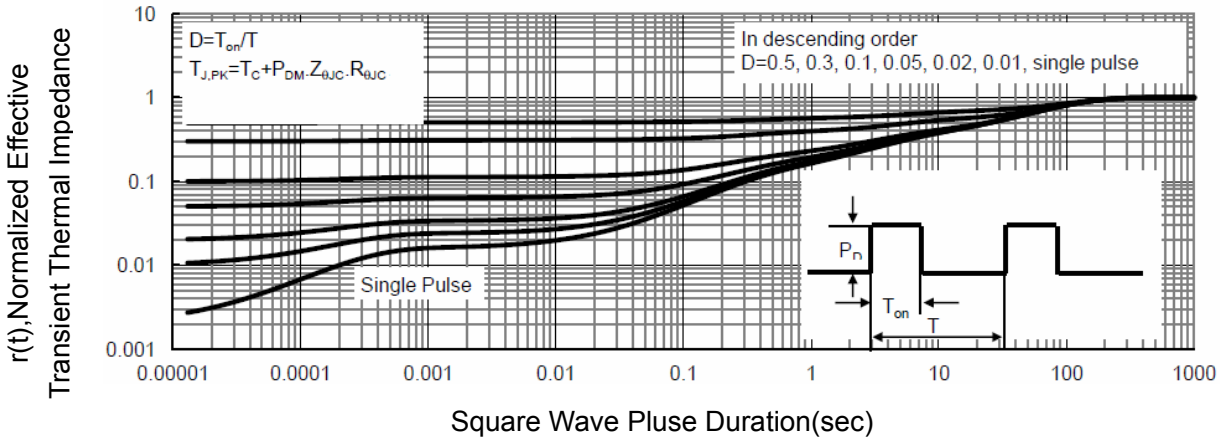
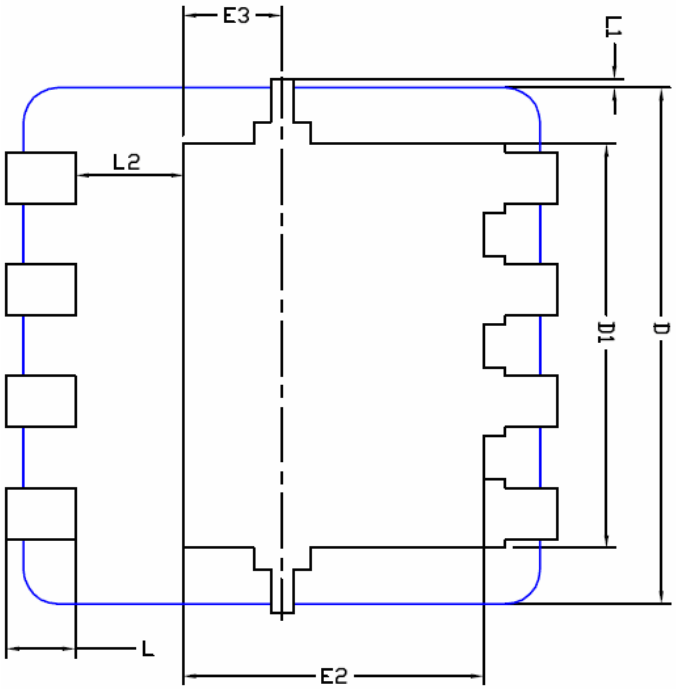
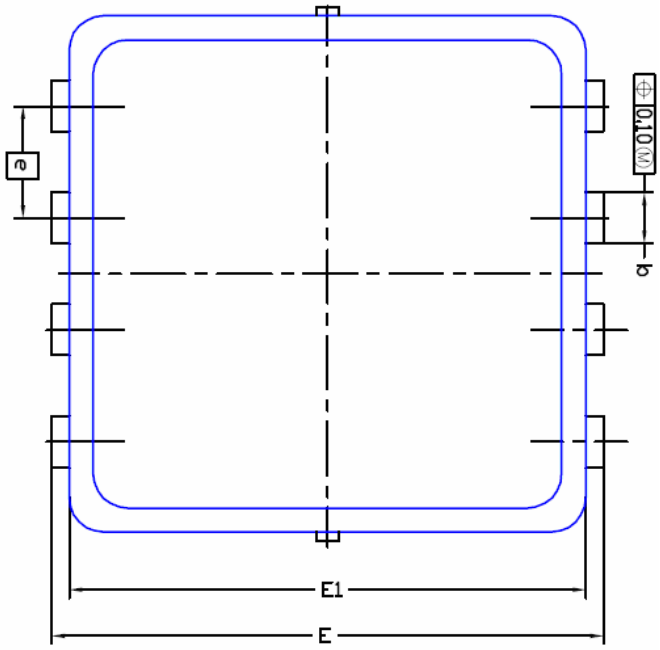
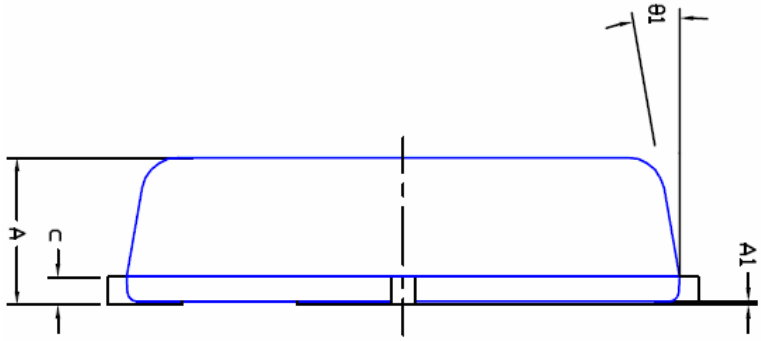


Figure 14 Normalized Maximum Transient Thermal Impedance

DFN3X3 EP Package Information







DIM.	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.700	0.80	0.900	0.0276	0.0315	0.0354
A1	0.00	---	0.05	0.000	---	0.002
b	0.24	0.30	0.35	0.009	0.012	0.014
c	0.10	0.152	0.25	0.004	0.006	0.010
D	3.00 BSC			0.118 BSC		
D1	2.35 BSC			0.093 BSC		
E	3.20 BSC			0.126 BSC		
E1	3.00 BSC			0.118 BSC		
E2	1.75 BSC			0.069 BSC		
E3	0.575 BSC			0.023 BSC		
e	0.65 BSC			0.026 BSC		
L2	0.685BSC			0.0274 BSC		
L	0.30	0.40	0.50	0.0118	0.0157	0.0197
L1	0	---	0.100	0	---	0.004
θ1	0°	10°	12°	0°	10°	12°

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