

NCE N-Channel Enhancement Mode Power MOSFET

Description

The NCE5520Q 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.

General Features

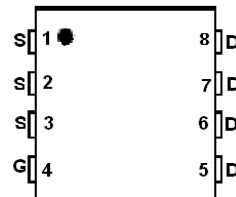
- $V_{DS} = 55V, I_D = 20A$
 $R_{DS(ON)} < 22m\Omega @ V_{GS} = 10V$ (Typ: 19m Ω)
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current

Application

- Industrial power supplies
- LED backlighting



Schematic diagram



Pin assignment



DFN3X3 EP top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE5520Q	NCE5520Q	DFN3X3EP	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	55	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	20	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	14	A
Pulsed Drain Current	I_{DM}	60	A
Maximum Power Dissipation	P_D	35	W
Derating factor		0.23	W/ $^\circ C$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	3.6	$^\circ C/W$
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Electrical Characteristics (T_C=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	55		-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =55V, 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	2	3	4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =10A	-	19	22	mΩ
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, F=1.0MHz	-	1340	-	PF
Output Capacitance	C _{oss}		-	123	-	PF
Reverse Transfer Capacitance	C _{rss}		-	10	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =25V, I _D =2A, R _L =3Ω, R _G =3Ω	-	6	-	nS
Turn-on Rise Time	t _r		-	2.5	-	nS
Turn-Off Delay Time	t _{d(off)}		-	22	-	nS
Turn-Off Fall Time	t _f		-	2.5	-	nS
Total Gate Charge	Q _g	V _{DS} =25V, I _D =10A, V _{GS} =10V	-	21	-	nC
Gate-Source Charge	Q _{gs}		-	5	-	nC
Gate-Drain Charge	Q _{gd}		-	3	-	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		-	-	20	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F =10A di/dt = 100A/μs (Note3)	-	16		nS
Reverse Recovery Charge	Q _{rr}		-	38		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. E_{AS} condition: T_J=25°C, V_{DD}=25V, V_G=10V, L=0.5mH, R_G=25Ω

Test circuit

1) E_{AS} test Circuits



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

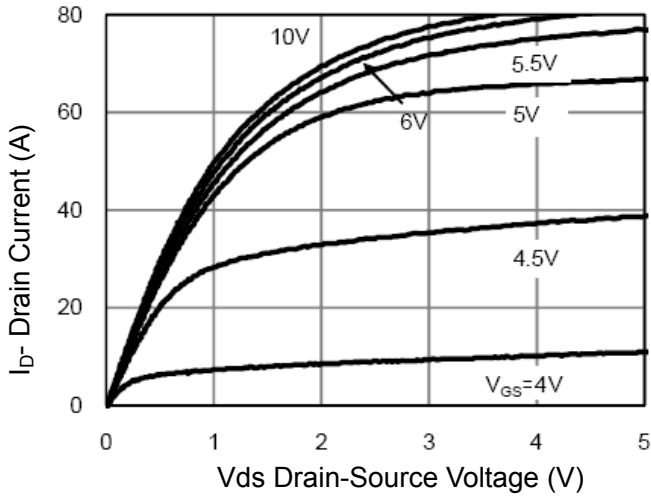


Figure 1 Output Characteristics

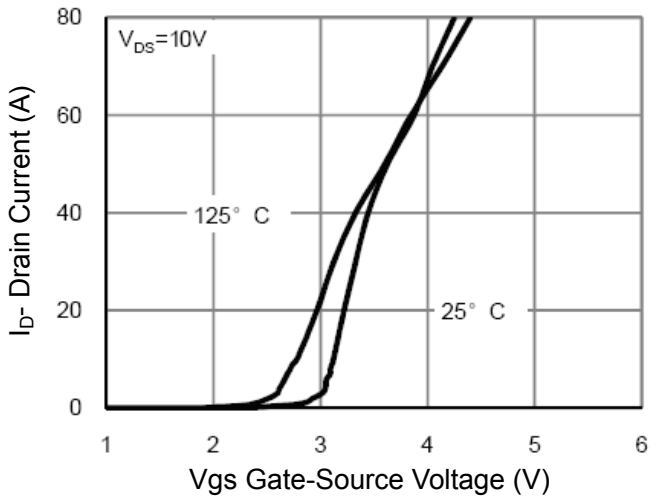


Figure 2 Transfer Characteristics

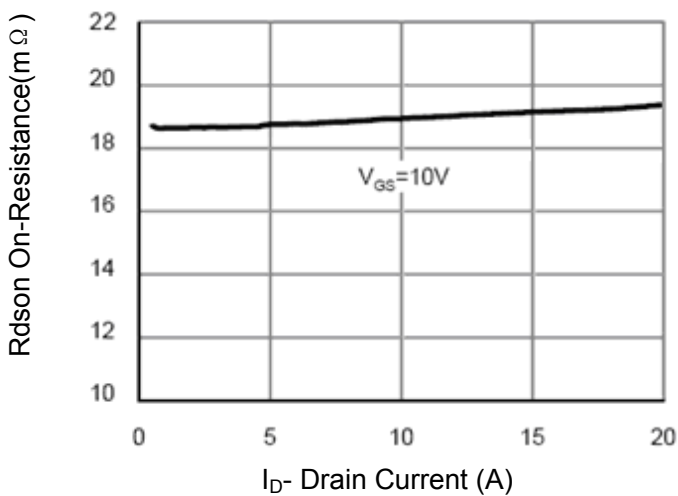


Figure 3 $R_{DS(on)}$ - Drain Current

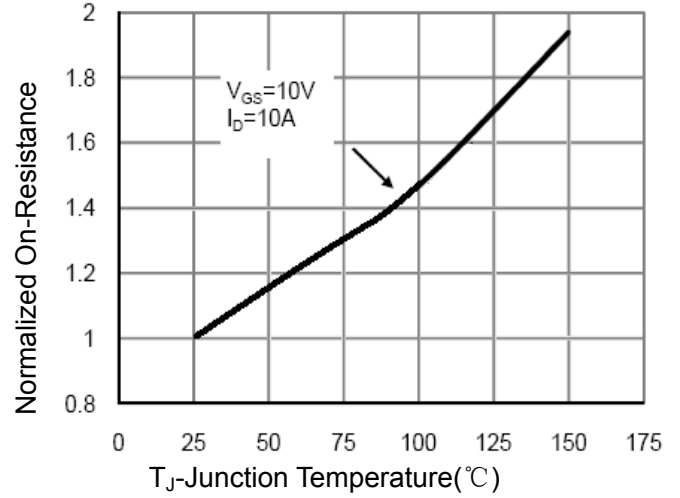


Figure 4 $R_{DS(on)}$ -Junction Temperature

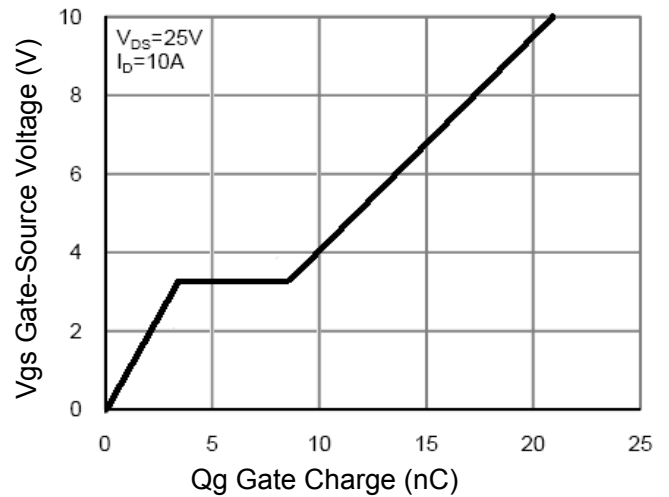


Figure 5 Gate Charge

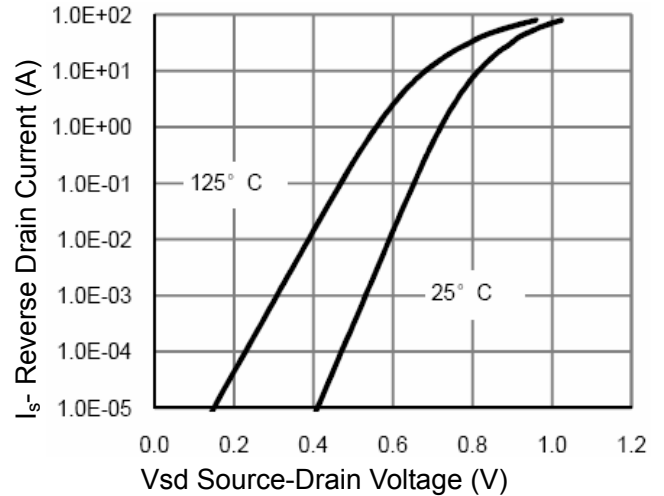


Figure 6 Source- Drain Diode Forward

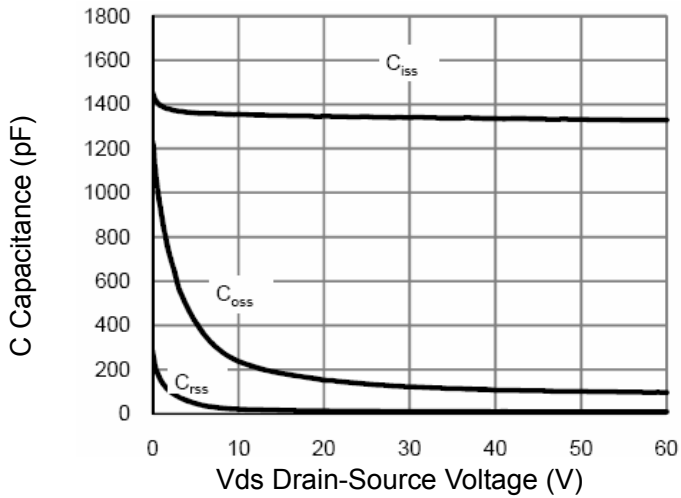


Figure 7 Capacitance vs Vds

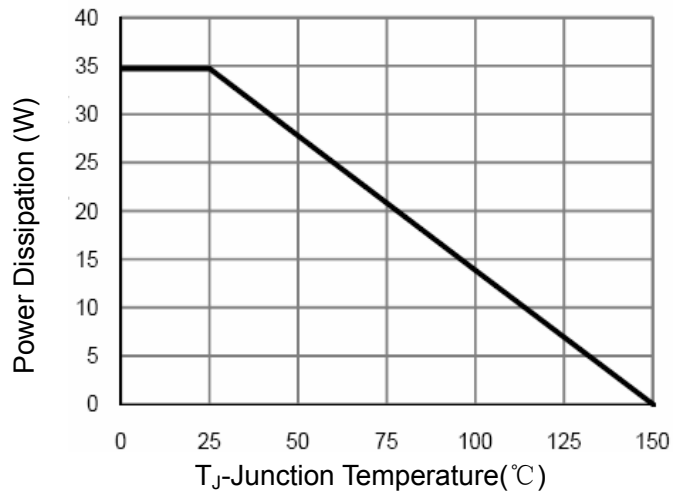


Figure 9 Power De-rating

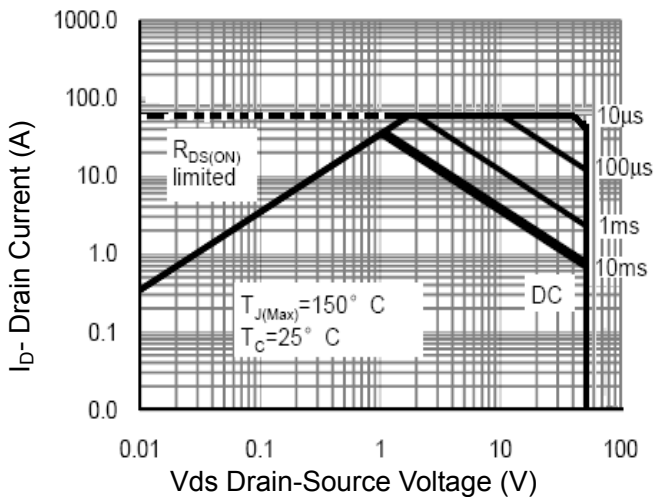


Figure 8 Safe Operation Area

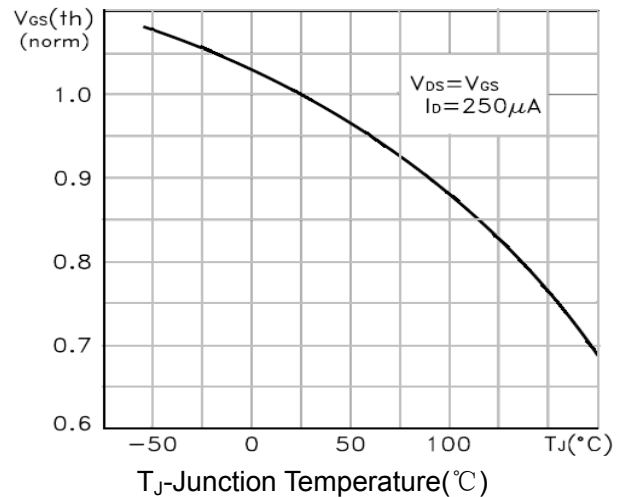


Figure 10 $V_{GS(th)}$ vs Junction Temperature

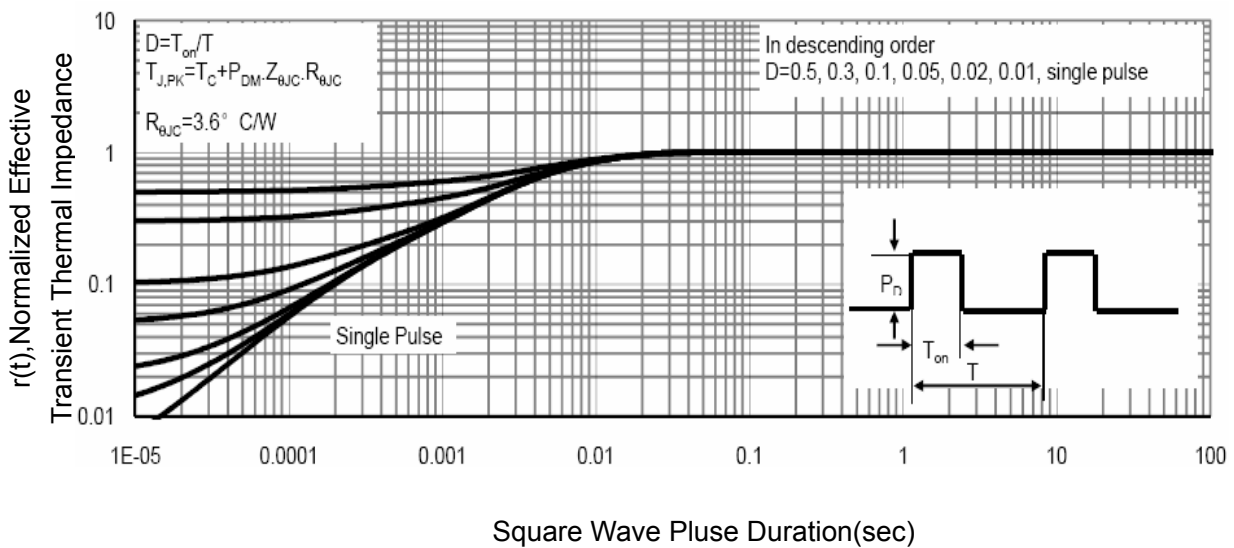
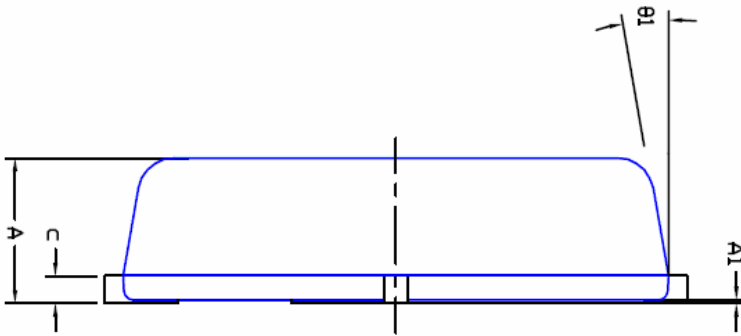
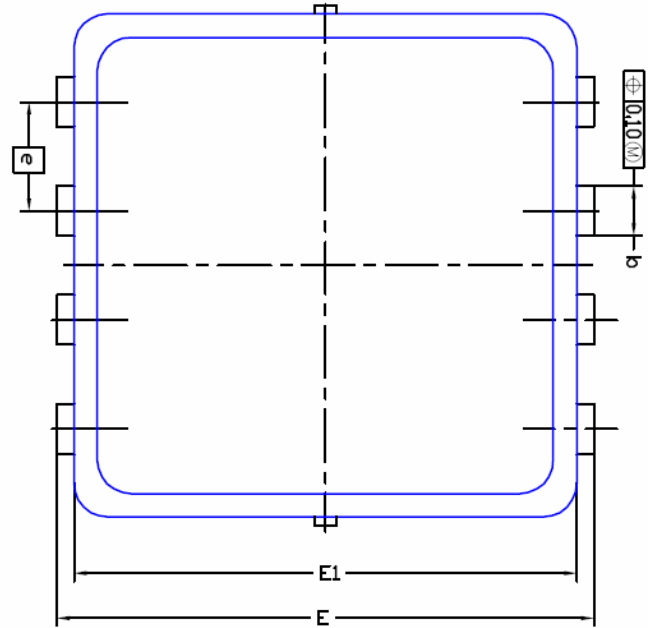
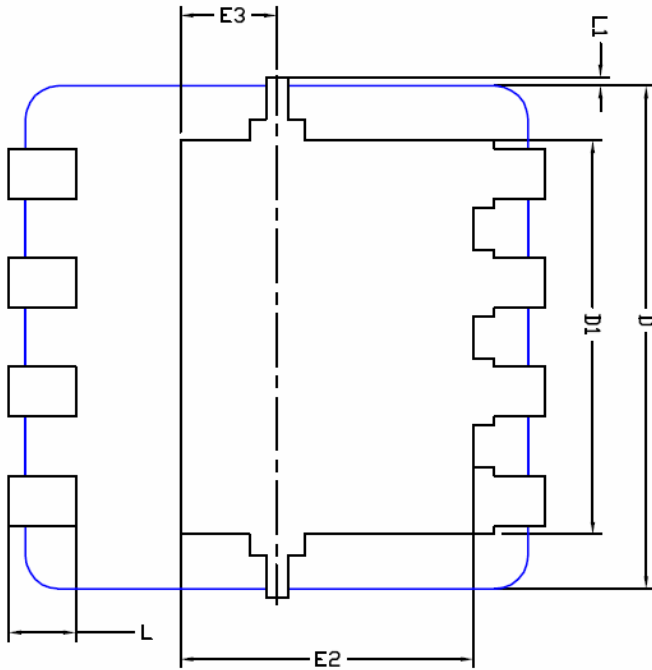


Figure 11 Normalized Maximum Transient Thermal Impedance

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		
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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