NCE N-Channel Enhancement Mode Power MOSFET

Description

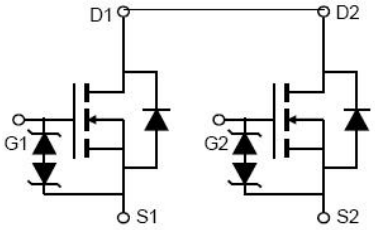
The NCE20ND08U uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

- V_{DS} =20V,I_D =12A
  $R_{DS(ON)}$ < 7.1mΩ @ V_{GS}=4.5V
  $R_{DS(ON)}$ < 7.3mΩ @ V_{GS}=4V
  $R_{DS(ON)}$ < 7.4mΩ @ V_{GS}=3.8V
  $R_{DS(ON)}$ < 9.0mΩ @ V_{GS}=3.1V
  $R_{DS(ON)}$ < 10mΩ @ V_{GS}=2.5V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- 2.5V Drive
- Common-drain type

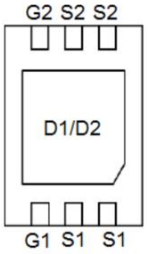
Application

- Battery protection switch
- Mobile device battery charging and discharging



Schematic diagram

Top View



Bottom View

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
20ND08U	NCE20ND08U	DFN2x3 -6L	-	-	-

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}	±12	V
Drain Current-Continuous	I_D	12	A
Pulsed Drain Current	I_{DM}	48	A
Maximum Power Dissipation	P_D	1.7	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	73.5	℃/W

Electrical Characteristics (TC=25℃unless otherwise noted)

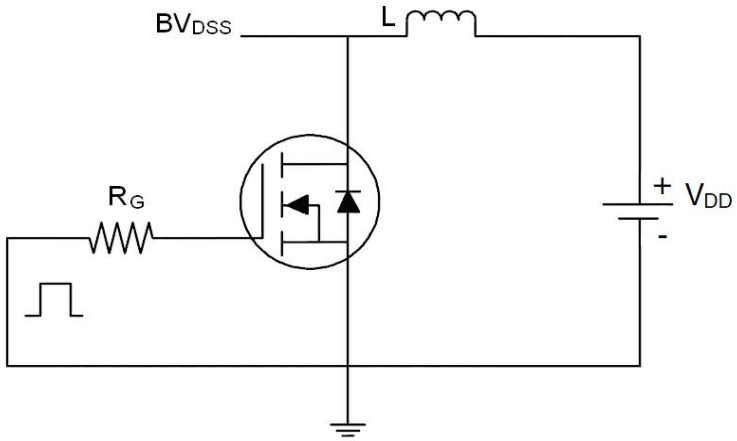
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	20	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±10V,V_{DS}=0V	-	-	±10	μA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	0.5	0.7	1	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=5A	-	6.0	7.1	mΩ
		V_{GS}=4 V, I_D=5A	-	6.1	7.3	
		V_{GS}=3.8V, I_D=5A	-	6.2	7.4	
		V_{GS}=2.5V, I_D=4A	-	7.5	9.0	
		V_{GS}=1.8V, I_D=1A	-	10	15	
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=5A	-	30	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=10V,V_{GS}=0V, F=1.0MHz	-	1550	-	pF
Output Capacitance	C_{oss}		-	250	-	pF
Reverse Transfer Capacitance	C_{rss}		-	210	-	pF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=10V,I_D=5A V_{GS}=4.5V,R_{GEN}=3Ω	-	2.0	-	nS
Turn-on Rise Time	t_r		-	5.5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	38	-	nS
Turn-Off Fall Time	t_f		-	85	-	nS
Total Gate Charge	Q_g	V_{DS}=10V,I_D=3A, V_{GS}=4.5V	-	17	-	nC
Gate-Source Charge	Q_{gs}		-	2.0	-	nC
Gate-Drain Charge	Q_{gd}		-	5.1	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=12A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	12	A

Notes:

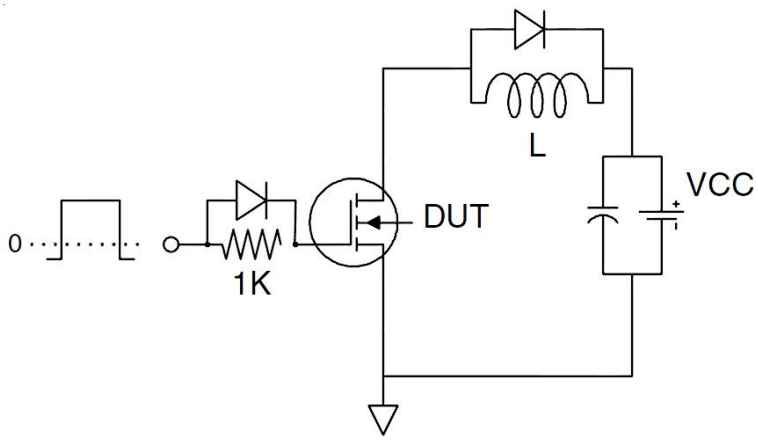
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

Test Circuit

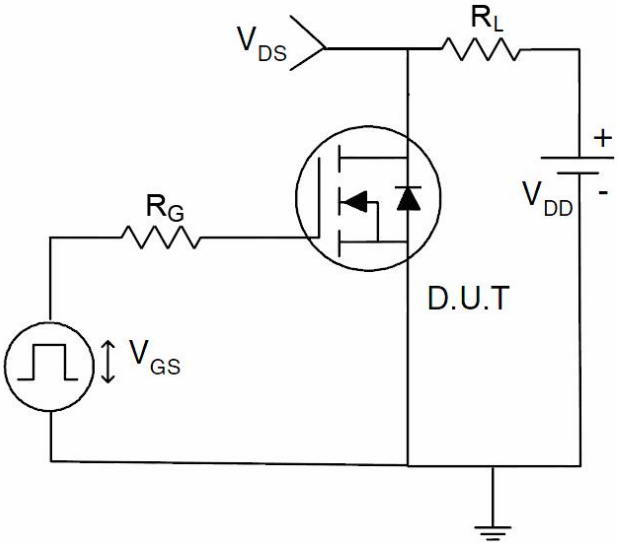
1) E_{AS} Test Circuits



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

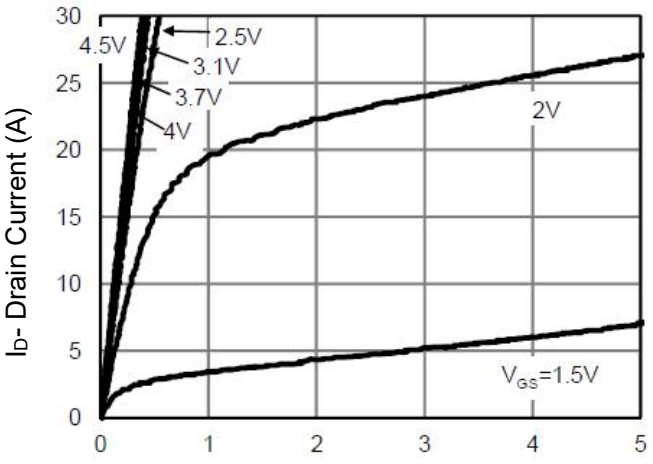


Figure 1 Output Characteristics

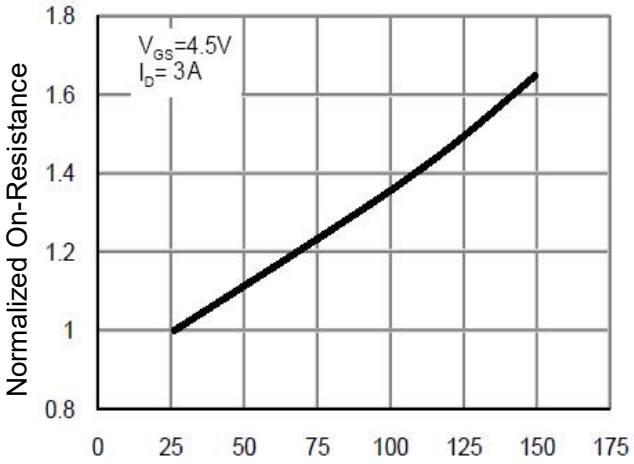


Figure 4 Rdson-Junction Temperature

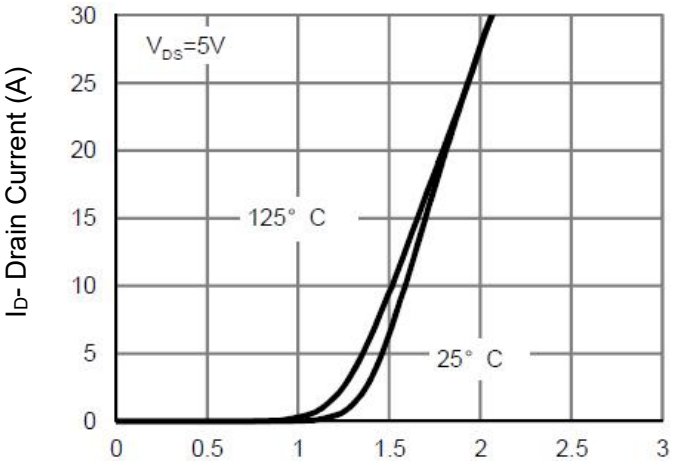


Figure 2 Transfer Characteristics

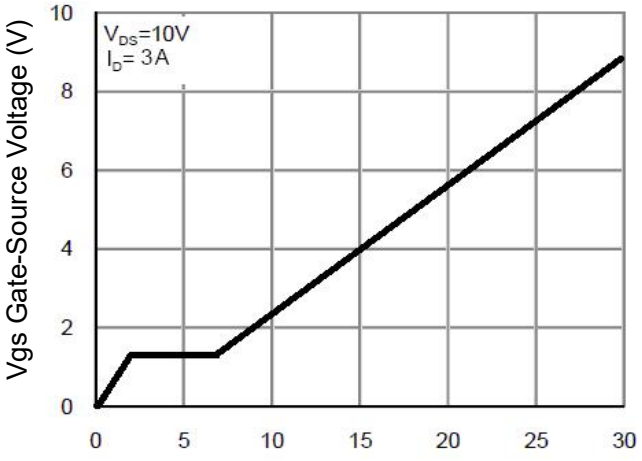


Figure 5 Gate Charge

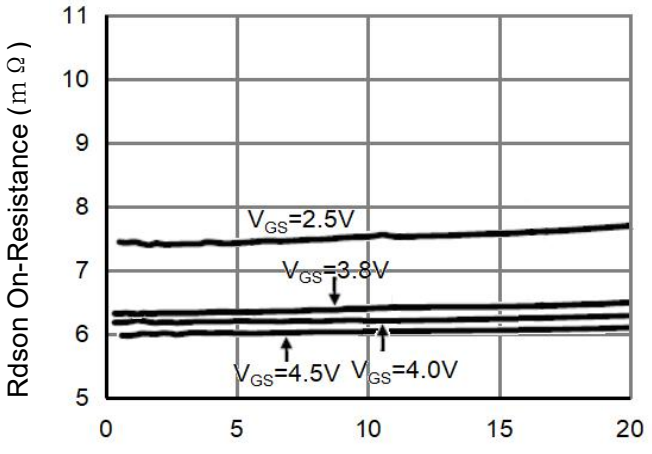


Figure 3 Rdson- Drain Current

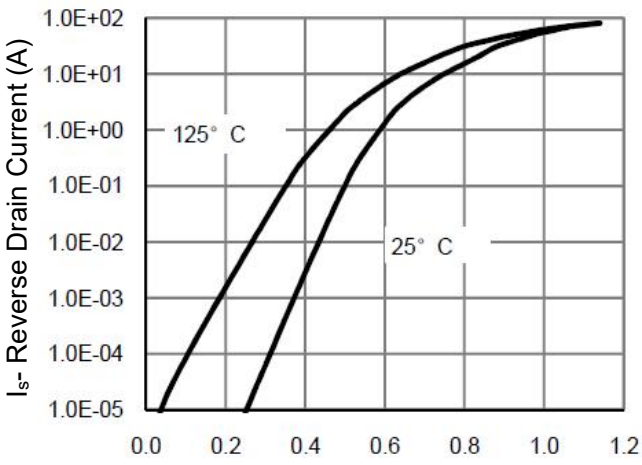


Figure 6 Source- Drain Diode Forward

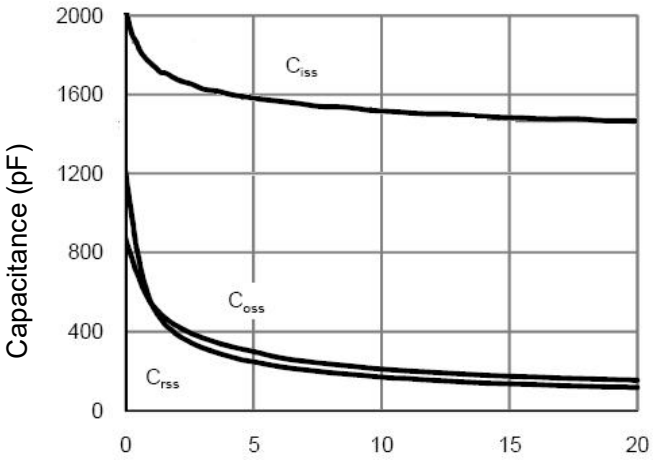


Figure 7 Capacitance vs Vds

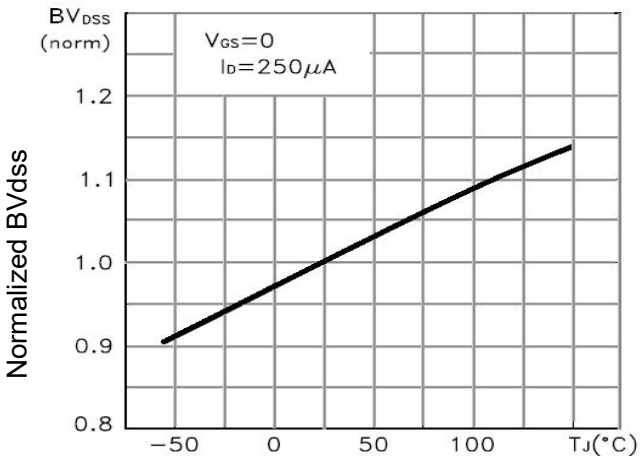


Figure 9 BV_{DSS} vs Junction Temperature

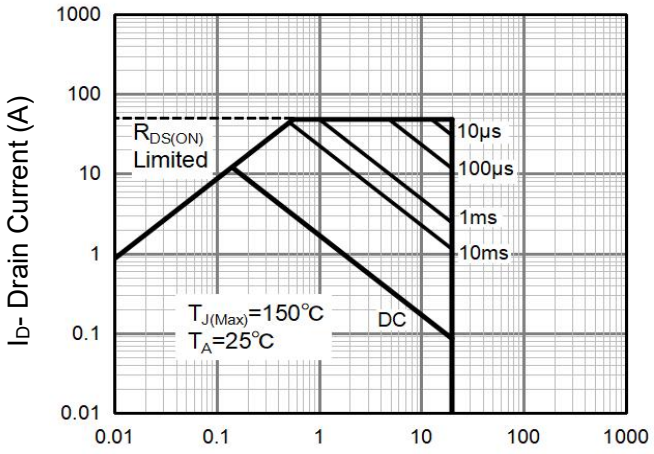


Figure 8 Safe Operation Area

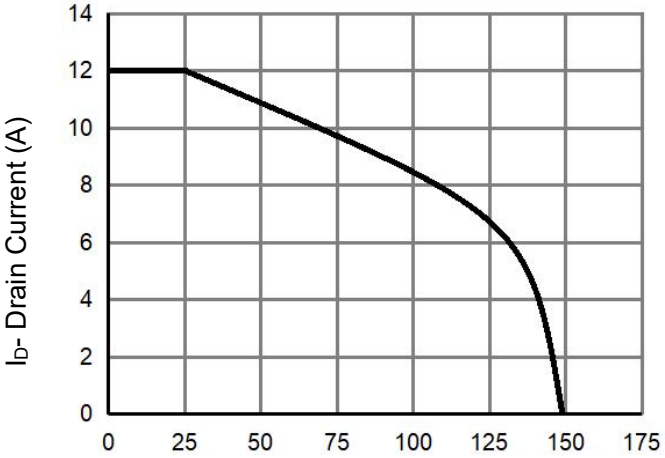


Figure 10 Current De-rating

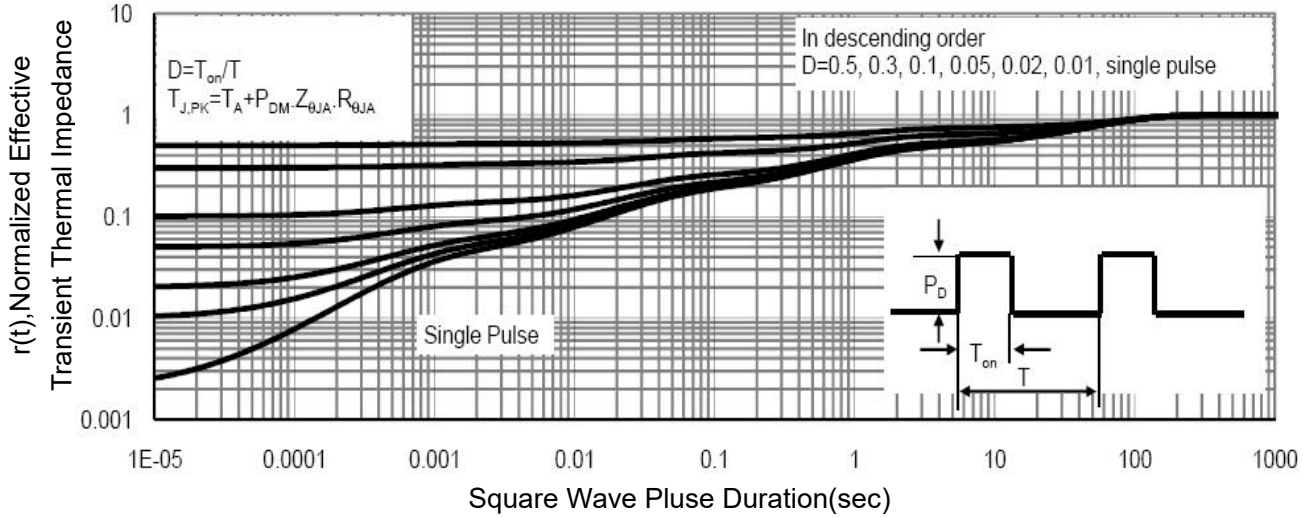
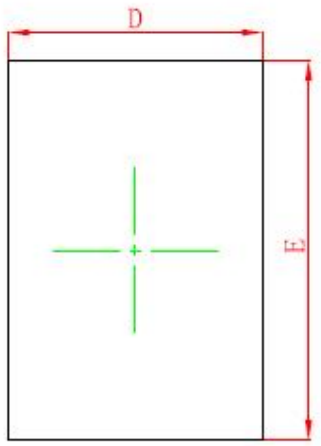
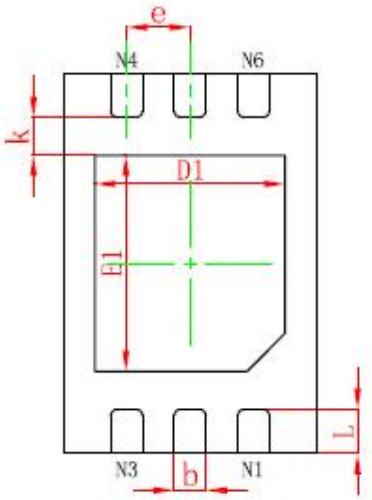


Figure 11 Normalized Maximum Transient Thermal Impedance

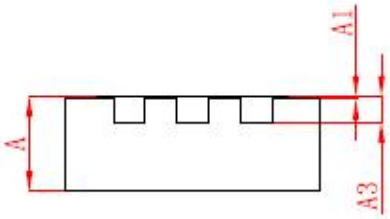
DFN2X3-6L Package Information



TOP VIEW

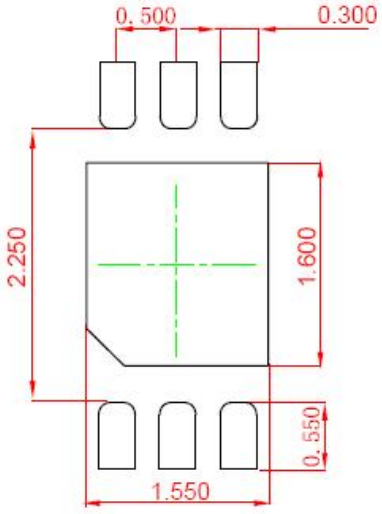


BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	1.950	2.050	0.077	0.081
E	2.950	3.050	0.116	0.120
D1	1.450	1.550	0.057	0.061
E1	1.650	1.750	0.065	0.069
k	0.200MIN.		0.008MIN.	
b	0.200	0.300	0.008	0.012
e	0.500TYP.		0.020TYP.	
L	0.300	0.400	0.012	0.016



Note:
1.Controlling dimension:In millimeters.
2,General tolerance:± 0.050mm.
3,The pad layout is for reference purposes only.

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