

## NCE N-Channel Super Trench Power MOSFET

### Description

The NCEP01ND35AG uses **Super Trench** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of  $R_{DS(ON)}$  and  $Q_g$ . This device is ideal for high-frequency switching and synchronous rectification.

### Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

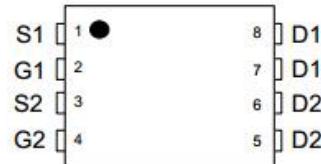
### General Features

- $V_{DS} = 100V, I_D = 35A$
- $R_{DS(ON)} = 24m\Omega$  (typical) @  $V_{GS} = 10V$
- $R_{DS(ON)} = 27m\Omega$  (typical) @  $V_{GS} = 4.5V$
- Excellent gate charge x  $R_{DS(on)}$  product(FOM)
- Very low on-resistance  $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating

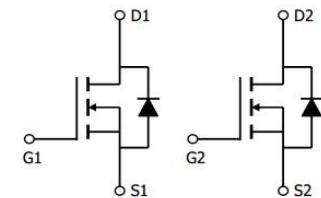
**100% UIS TESTED!**  
**100%  $\Delta V_{ds}$  TESTED!**



DFN 5X6



Pin Assignment



Schematic Diagram

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
P01ND35AG	NCEP01ND35AG	DFN5X6-8L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	35	A
Drain Current-Continuous( $T_c=100^\circ C$ )	$I_D (100^\circ C)$	24.5	A
Pulsed Drain Current	$I_{DM}$	140	A
Maximum Power Dissipation	$P_D$	50	W
Derating factor		0.4	W/°C
Single pulse avalanche energy (Note 1)	$E_{AS}$	200	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	°C

### Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.5	°C/W
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**Electrical Characteristics ( $T_c=25^\circ\text{C}$  unless otherwise noted)**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$\text{BV}_{\text{DSS}}$	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_D=250\mu\text{A}$	100	-	-	V
Zero Gate Voltage Drain Current	$\text{I}_{\text{DSS}}$	$\text{V}_{\text{DS}}=100\text{V}, \text{V}_{\text{GS}}=0\text{V}$	-	-	1	$\mu\text{A}$
Gate-Body Leakage Current	$\text{I}_{\text{GSS}}$	$\text{V}_{\text{GS}}=\pm 20\text{V}, \text{V}_{\text{DS}}=0\text{V}$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
Gate Threshold Voltage	$\text{V}_{\text{GS(th)}}$	$\text{V}_{\text{DS}}=\text{V}_{\text{GS}}, \text{I}_D=250\mu\text{A}$	1.2	2.0	2.8	V
Drain-Source On-State Resistance	$\text{R}_{\text{DS(ON)}}$	$\text{V}_{\text{GS}}=10\text{V}, \text{I}_D=20\text{A}$	-	24	28	$\text{m}\Omega$
		$\text{V}_{\text{GS}}=4.5\text{V}, \text{I}_D=20\text{A}$	-	27	32	$\text{m}\Omega$
Forward Transconductance	$\text{g}_{\text{FS}}$	$\text{V}_{\text{DS}}=5\text{V}, \text{I}_D=20\text{A}$	-	35	-	S
<b>Dynamic Characteristics</b>						
Input Capacitance	$\text{C}_{\text{iss}}$	$\text{V}_{\text{DS}}=50\text{V}, \text{V}_{\text{GS}}=0\text{V},$ $F=1.0\text{MHz}$	-	1600	-	PF
Output Capacitance	$\text{C}_{\text{oss}}$		-	139	-	PF
Reverse Transfer Capacitance	$\text{C}_{\text{rss}}$		-	11	-	PF
<b>Switching Characteristics</b> (Note 2)						
Turn-on Delay Time	$\text{t}_{\text{d(on)}}$	$\text{V}_{\text{DD}}=50\text{V}, \text{I}_D=20\text{A}$ $\text{V}_{\text{GS}}=10\text{V}, \text{R}_G=1.6\Omega$	-	6	-	nS
Turn-on Rise Time	$\text{t}_r$		-	2	-	nS
Turn-Off Delay Time	$\text{t}_{\text{d(off)}}$		-	18	-	nS
Turn-Off Fall Time	$\text{t}_f$		-	2	-	nS
Total Gate Charge	$\text{Q}_g$	$\text{V}_{\text{DS}}=50\text{V}, \text{I}_D=20\text{A},$ $\text{V}_{\text{GS}}=10\text{V}$	-	26	-	nC
Gate-Source Charge	$\text{Q}_{\text{gs}}$		-	7.4	-	nC
Gate-Drain Charge	$\text{Q}_{\text{gd}}$		-	3.8	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage	$\text{V}_{\text{SD}}$	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_s=35\text{A}$	-		1.2	V
Diode Forward Current	$\text{I}_s$	$\text{T}_J = 25^\circ\text{C}, \text{I}_F = 20\text{A}$ $d\text{I}/dt = 500\text{A}/\mu\text{s}$	-	-	35	A
Reverse Recovery Time	$\text{t}_{\text{rr}}$		-		26	nS
Reverse Recovery Charge	$\text{Q}_{\text{rr}}$		-		98	nC

**Notes:**

- EAS condition :  $\text{T}_j=25^\circ\text{C}, \text{V}_{\text{DD}}=20\text{V}, \text{V}_{\text{G}}=10\text{V}, \text{L}=0.5\text{mH}, \text{R}_g=25\Omega$
- Guaranteed by design, not subject to production
- These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink  $k$ , assuming a maximum junction temperature of  $\text{T}_J(\text{MAX})=150^\circ\text{C}$ . The SOA curve provides a single pulse rating.

## Typical Electrical and Thermal Characteristics

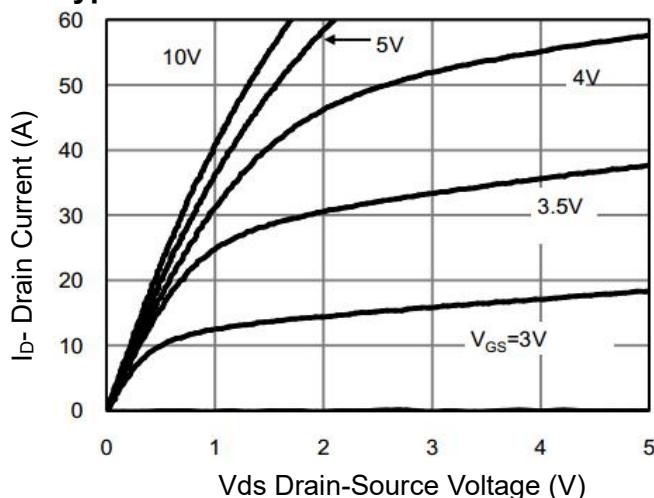


Figure 1 Output Characteristics

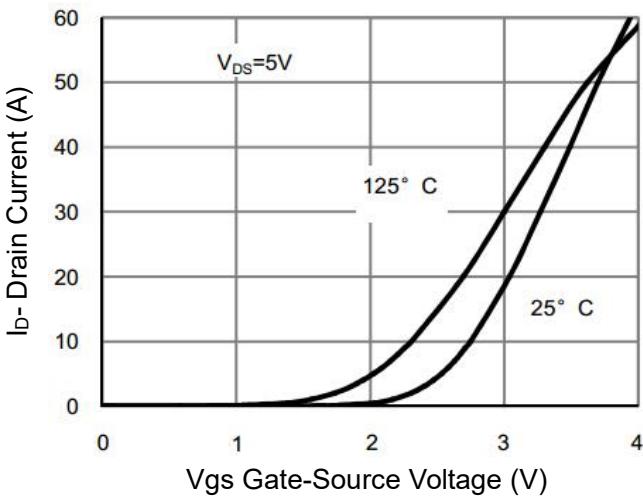


Figure 2 Transfer Characteristics

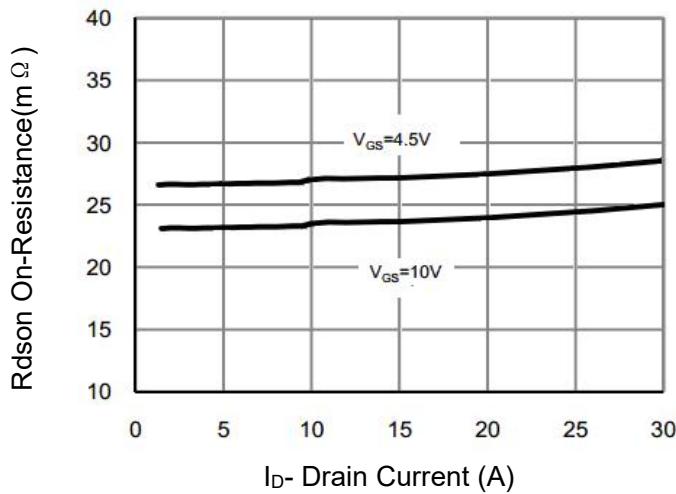


Figure 3 Rdson- Drain Current

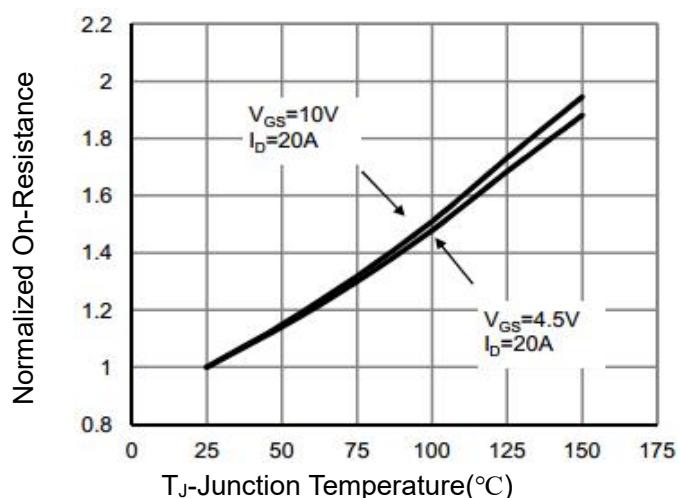


Figure 4 Rdson-Junction Temperature

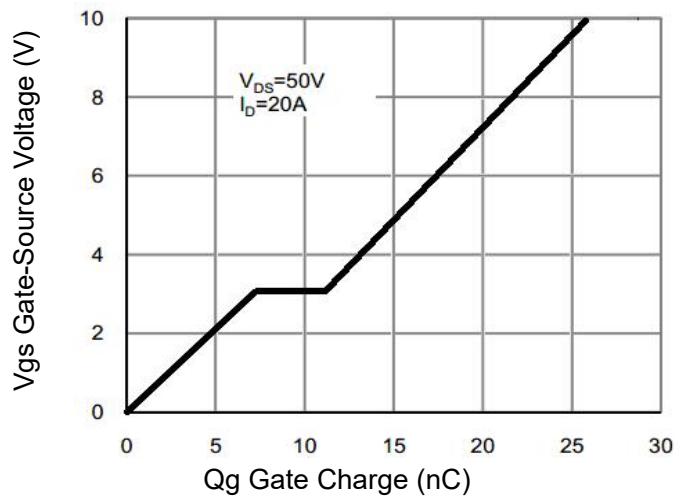


Figure 5 Gate Charge

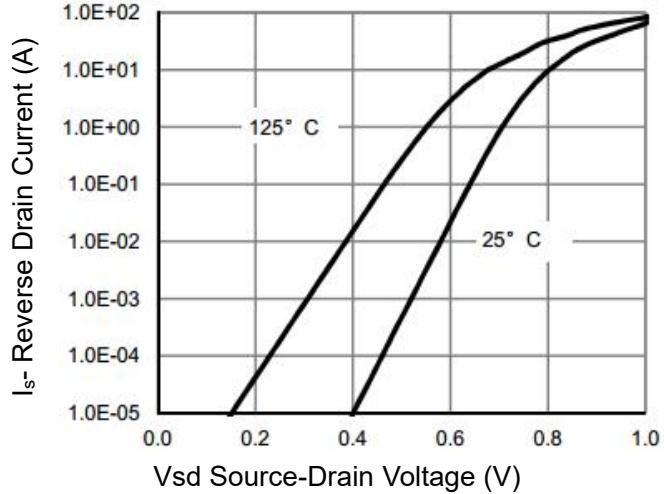
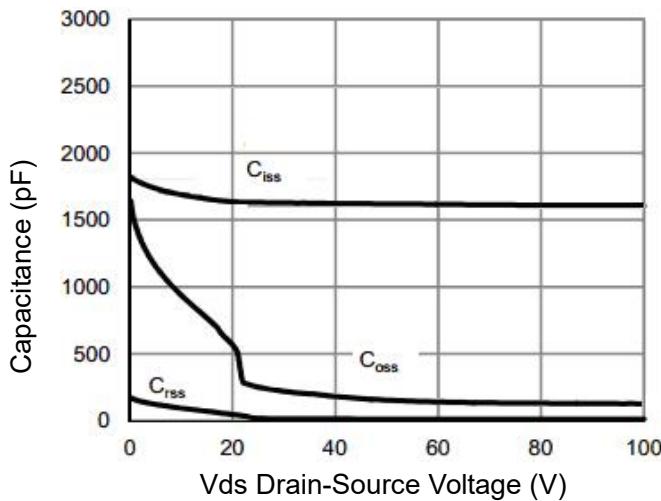
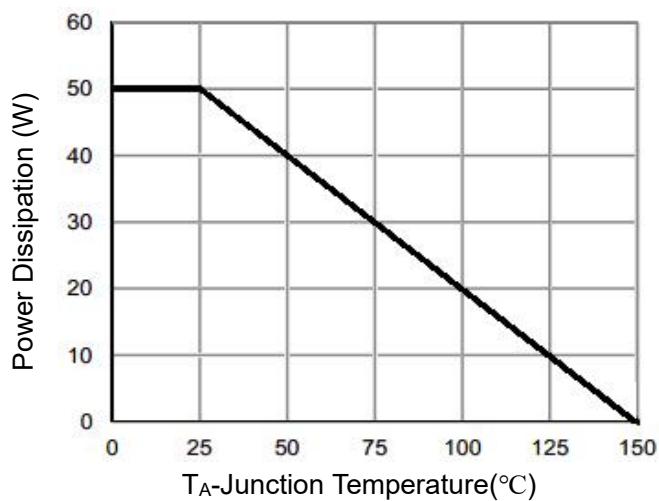


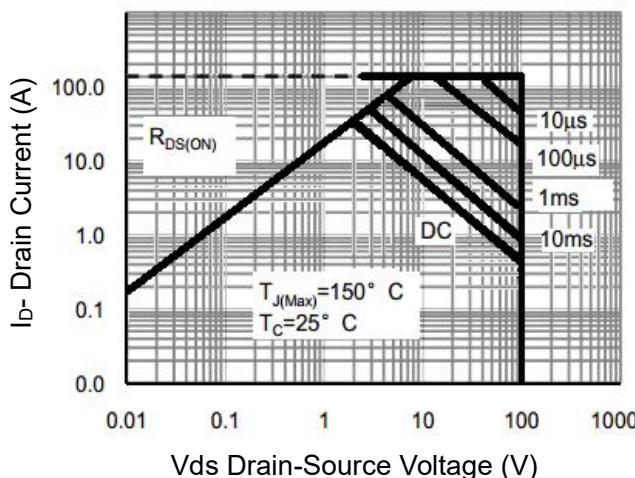
Figure 6 Source- Drain Diode Forward



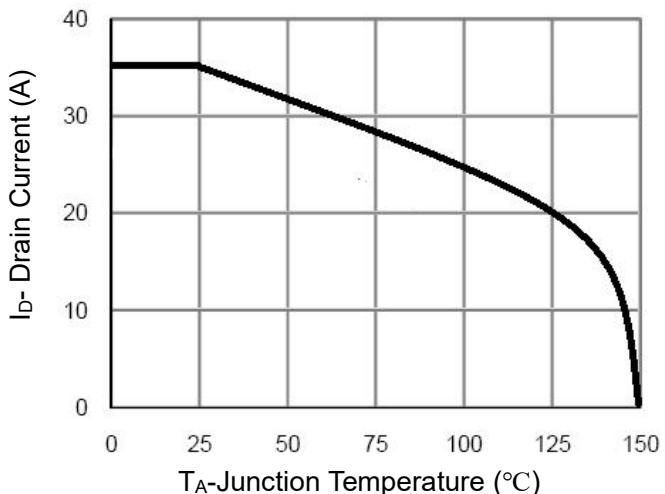
**Figure 7 Capacitance vs Vds**



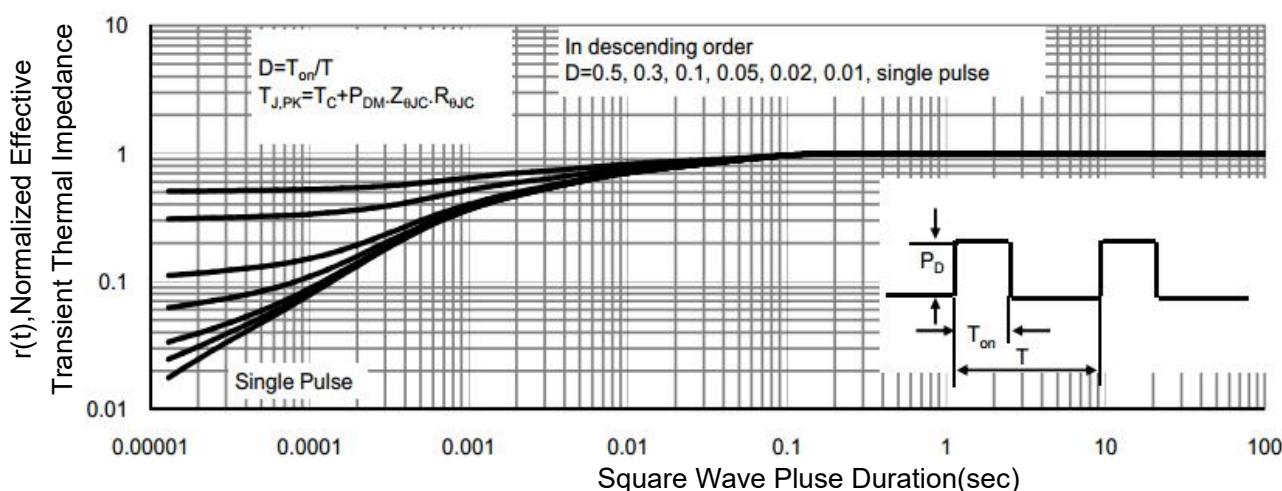
**Figure 9 Power De-rating**



**Figure 8 Safe Operation Area** (Note 3)

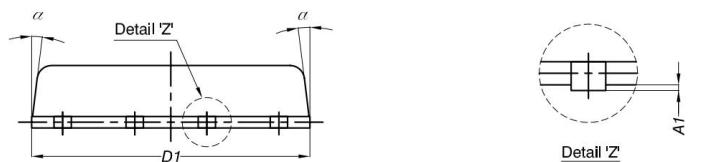
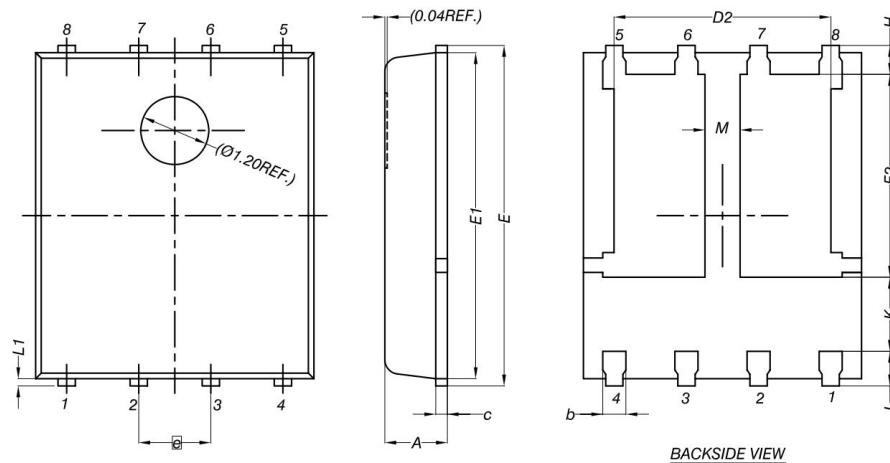


**Figure 10 Current De-rating**

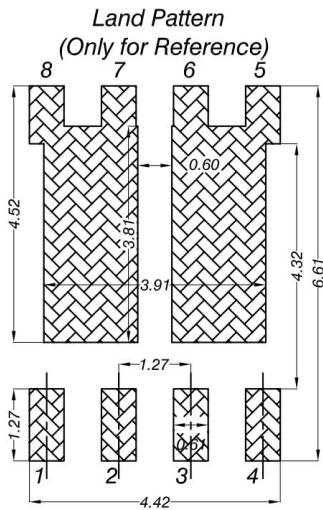


**Figure 11 Normalized Maximum Transient Thermal Impedance**

## DFN5X6-8L Package Information



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0	---	0.05
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
[e]	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
M	0.50	-	-
alpha	0°	-	12°



### Note:

- All Dimension Are In mm.
- Package Body Sizes Exclude Mold Flash, Protrusion Or Gate Burrs.  
Mold Flash, Protrusion Or Gate Burrs Shall Not Exceed 0.10 mm Per Side.
- Package Body Sizes Determined At The Outermost Extremes Of The Plastic Body Exclusive Of Mold Flash, Tie Bar , Tie Bar Burrs, Gate Burrs And Interlead Flash, But Including Any Mismatch Between The Top And Bottom Of The Plastic Body.
- The Package Top May Be Smaller Than The Package Bottom.

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