

#### NCE P-Channel Enhancement Mode Power MOSFET

#### **Description**

The NCE55P30 uses advanced trench technology and design to provide excellent R<sub>DS(ON)</sub> with low gate charge. It can be used in a wide variety of applications.

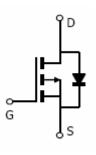
#### **General Features**

- V<sub>DS</sub> =-55V,I<sub>D</sub> =-30A  $R_{DS(ON)}$  <40m $\Omega$  @  $V_{GS}$ =-10V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E<sub>AS</sub>
- Excellent package for good heat dissipation

## **Application**

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

100% UIS TESTED!



#### Schematic diagram



#### Marking and pin assignment



**Package Marking and Ordering Information** 

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE55P30	NCE55P30	TO-220-3L	-	-	-

Absolute Maximum Ratings (T<sub>c</sub>=25°Cunless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	-55	V
Gate-Source Voltage	Vgs	±20	V
Drain Current-Continuous	I <sub>D</sub>	-30	Α
Drain Current-Continuous(T <sub>C</sub> =100 °C)	I <sub>D</sub> (100℃)	-21	А
Pulsed Drain Current	I <sub>DM</sub>	110	А
Maximum Power Dissipation	P <sub>D</sub>	90	W
Derating factor		0.72	W/°C
Single pulse avalanche energy (Note 5)	E <sub>AS</sub>	420	mJ
Operating Junction and Storage Temperature Range	$T_{J}, T_{STG}$	-55 To 150	$^{\circ}$



**NCE55P30** 

#### **Thermal Characteristic**

Thermal Resistance, Junction-to-Case (Note 2)	$R_{ heta JC}$	1.39	°C/W	
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#### Electrical Characteristics (T<sub>C</sub>=25°C unless otherwise noted)

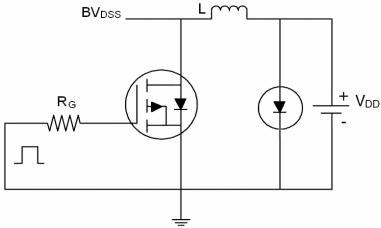
Parameter	Symbol	Condition	Min	Тур	Max	Unit
Off Characteristics	·					
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =-250μA	-55	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-55V,V <sub>GS</sub> =0V	-	-	1	μΑ
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V,V <sub>DS</sub> =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V <sub>DS</sub> =V <sub>GS</sub> ,I <sub>D</sub> =-250μA	-2	-2.6	-4	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-15A	-	30	40	mΩ
Forward Transconductance	<b>g</b> FS	V <sub>DS</sub> =-25V,I <sub>D</sub> =-16A	8	-	-	S
Dynamic Characteristics (Note4)	-		<b>-</b>	ı		
Input Capacitance	C <sub>lss</sub>	)/ 00)/)/ 0)/	-	3500	-	PF
Output Capacitance	C <sub>oss</sub>	V <sub>DS</sub> =-30V,V <sub>GS</sub> =0V,	-	240	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>	F=1.0MHz	-	153	-	PF
Switching Characteristics (Note 4)	<u> </u>		•			
Turn-on Delay Time	t <sub>d(on)</sub>		-	12	-	nS
Turn-on Rise Time	t <sub>r</sub>	V <sub>DD</sub> =-30V,I <sub>D</sub> =-15A	-	15	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>	$V_{GS}$ =-10 $V$ , $R_{GEN}$ =3 $\Omega$	-	38	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	15	-	nS
Total Gate Charge	Qg	\/ - 44\/ I - 4CA	-	56	-	nC
Gate-Source Charge	Q <sub>gs</sub>	$V_{DS}$ =-44V, $I_{D}$ =-16A, $V_{GS}$ =-10V	-	11	-	nC
Gate-Drain Charge	$Q_{gd}$	V <sub>GS</sub> =-10V	-	24	-	nC
Drain-Source Diode Characteristics	<u> </u>		•			
Diode Forward Voltage (Note 3)	$V_{SD}$	V <sub>GS</sub> =0V,I <sub>S</sub> =-24A	-	-	1.2	V
Diode Forward Current (Note 2)	I <sub>S</sub>		-	-	-30	Α
Reverse Recovery Time	t <sub>rr</sub>	TJ = 25°C, IF = -15A	-	-	71	nS
Reverse Recovery Charge	Qrr	di/dt = 100A/µs <sup>(Note3)</sup>	-	-	170	nC
Forward Turn-On Time	t <sub>on</sub>	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD				v LS+LD)

## Notes:

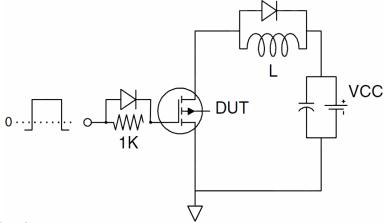
- 1. Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2. Surface Mounted on FR4 Board, t ≤ 10 sec.
- 3. Pulse Test: Pulse Width ≤ 300µs, Duty Cycle ≤ 2%.
- 4. Guaranteed by design, not subject to production
- **5.**  $E_{AS}$  condition:  $Tj=25^{\circ}C$ , $V_{DD}$ =-25V, $V_{G}$ =-20V,L=1mH, $Rg=25\Omega$ , $I_{AS}$ =29A

## **Test Circuit**

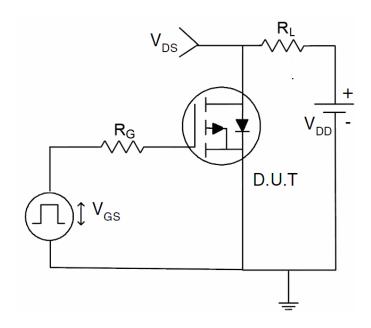
## 1) E<sub>AS</sub> Test Circuit



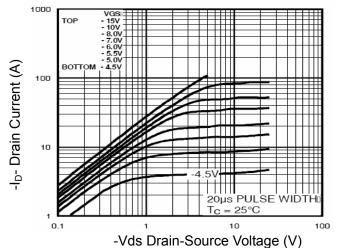
## 2) Gate Charge Test Circuit



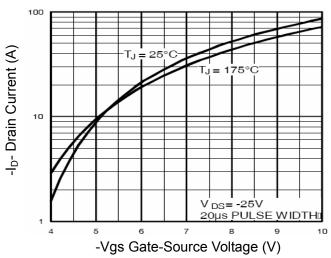
## 3) Switch Time Test Circuit



## **Typical Electrical and Thermal Characteristics (Curves)**



**Figure 1 Output Characteristics** 



**Figure 2 Transfer Characteristics** 

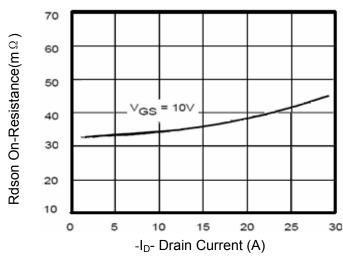


Figure 3 Rdson- Drain Current

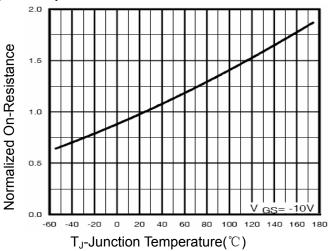


Figure 4 Rdson-JunctionTemperature

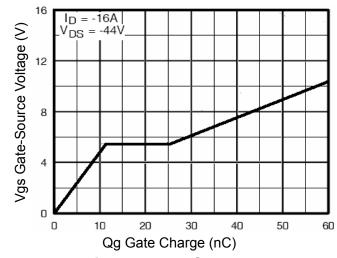


Figure 5 Gate Charge

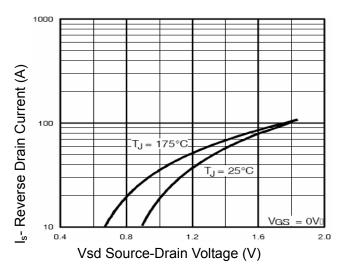


Figure 6 Source- Drain Diode Forward

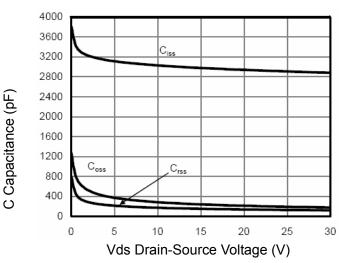


Figure 7 Capacitance vs Vds

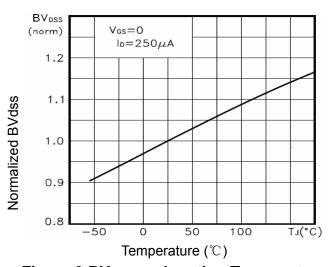
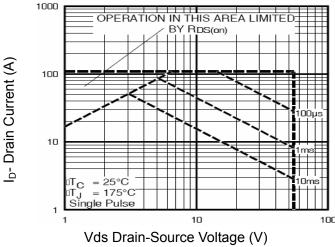


Figure 9 BV<sub>DSS</sub> vs Junction Temperature



**Figure 8 Safe Operation Area** 

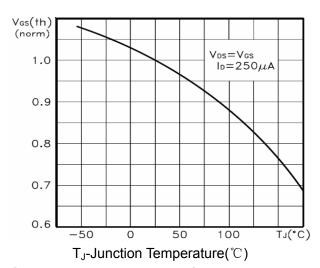


Figure 10 V<sub>GS(th)</sub> vs Junction Temperature

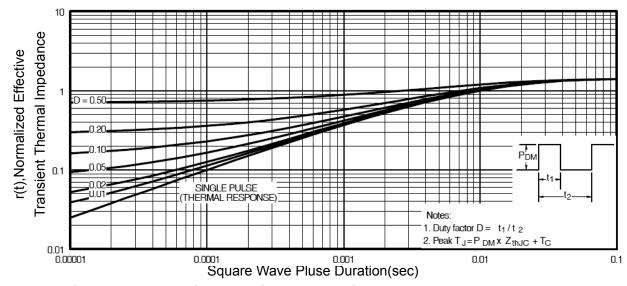
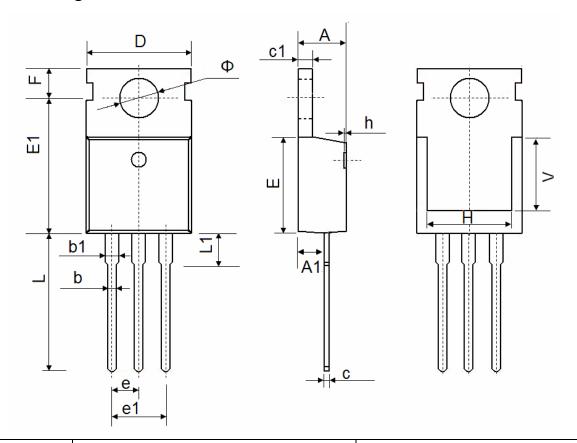


Figure 11 Normalized Maximum Transient Thermal Impedance

# **TO-220-3L Package Information**



Symbol	Dimensions	In Millimeters	Dimensions In Inches		
Symbol	Min.	Max.	Min.	Max.	
А	4.400	4.600	0.173	0.181	
A1	2.250	2.550	0.089	0.100	
b	0.710	0.910	0.028	0.036	
b1	1.170	1.370	0.046	0.054	
С	0.330	0.650	0.013	0.026	
c1	1.200	1.400	0.047	0.055	
D	9.910	10.250	0.390	0.404	
Е	8.9500	9.750	0.352	0.384	
E1	12.650	12.950	0.498	0.510	
е	2.540	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204	
F	2.650	2.950	0.104	0.116	
Н	7.900	8.100	0.311	0.319	
h	0.000	0.300	0.000	0.012	
L	12.900	13.400	0.508	0.528	
L1	2.850	3.250	0.112	0.128	
V	7.500 REF.		0.295 REF.		
Ф	3.400	3.800	0.134	0.150	

#### http://www.ncepower.com

NCE55P30

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