

## NCE P-Channel Enhancement Mode Power MOSFET

### Description

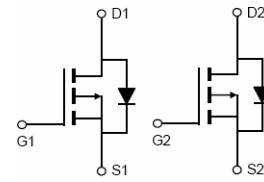
The NCE4801 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications.

### General Features

- $V_{DS} = -30V, I_D = -5A$   
 $R_{DS(ON)} < 80m\Omega @ V_{GS} = -2.5V$   
 $R_{DS(ON)} < 57m\Omega @ V_{GS} = -4.5V$   
 $R_{DS(ON)} < 48m\Omega @ V_{GS} = -10V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package

### Application

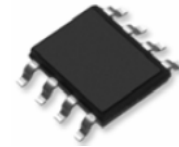
- PWM applications
- Load switch
- Power management



Schematic diagram



Marking and Pin Assignment



SOP-8 top view

### Package Marking And Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE4801	NCE4801	SOP-8	Ø330mm	12mm	4000 units

### Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	±12	V
Drain Current-Continuous	$I_D$	-5	A
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	-28	A
Maximum Power Dissipation	$P_D$	2	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	°C

### Thermal Characteristic

Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup>	$R_{\theta JA}$	62.5	°C/W
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### Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-30		-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -30V, V_{GS} = 0V$	-	-	-1	μA

Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> <sup>(Note 3)</sup>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.7	-1	-1.3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-5A$	-	40	48	m $\Omega$
		$V_{GS}=-4.5V, I_D=-4A$	-	45	57	m $\Omega$
		$V_{GS}=-2.5V, I_D=-3A$		60	80	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-5V, I_D=-5A$	-	10	-	S
<b>Dynamic Characteristics</b> <sup>(Note4)</sup>						
Input Capacitance	$C_{iss}$	$V_{DS}=-15V, V_{GS}=0V,$ $F=1.0MHz$	-	880	-	PF
Output Capacitance	$C_{oss}$		-	105	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	65	-	PF
<b>Switching Characteristics</b> <sup>(Note 4)</sup>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-15V, I_D=-5A$ $V_{GS}=-10V, R_{GEN}=6\Omega$	-	7	-	nS
Turn-on Rise Time	$t_r$		-	3	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	30	-	nS
Turn-Off Fall Time	$t_f$		-	12	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-15V, I_D=-5A, V_{GS}=-4.5V$	-	8.5	-	nC
Gate-Source Charge	$Q_{gs}$		-	1.8	-	nC
Gate-Drain Charge	$Q_{gd}$		-	2.7	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note 3)</sup>	$V_{SD}$	$V_{GS}=0V, I_S=-5A$	-	-	-1.2	V

### Notes:

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

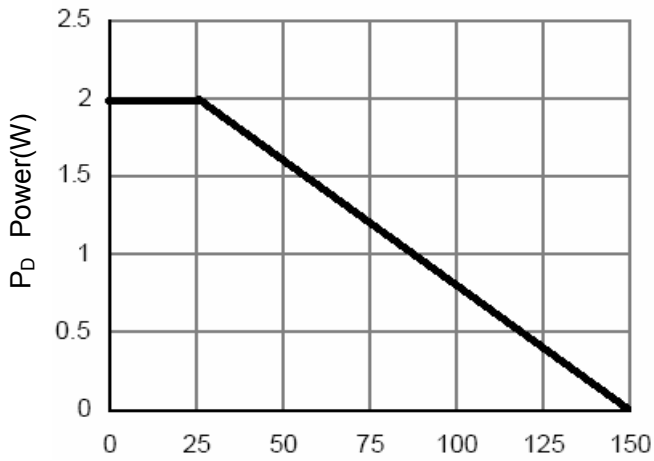
Typical Electrical and Thermal Characteristics



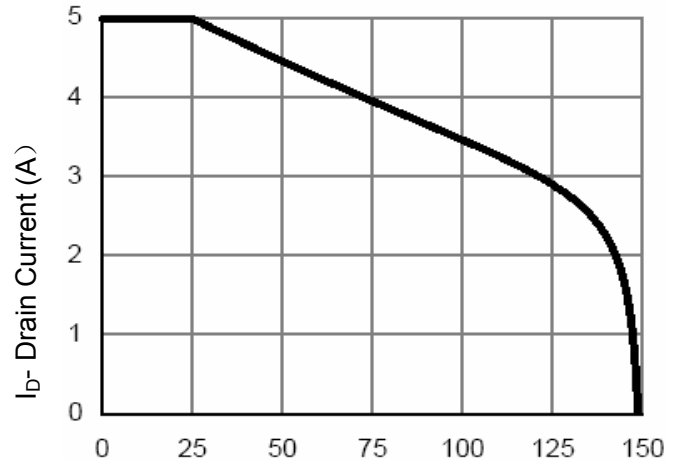
Figure 1: Switching Test Circuit



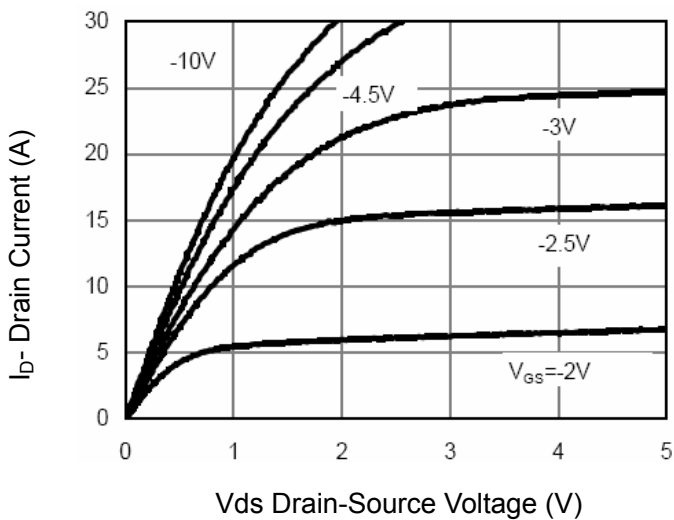
Figure 2: Switching Waveforms



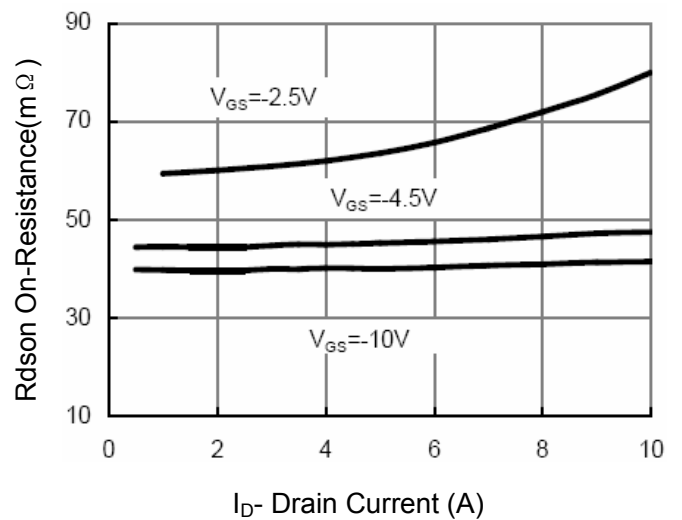
T<sub>J</sub>-Junction Temperature(°C)  
Figure 3 Power Dissipation



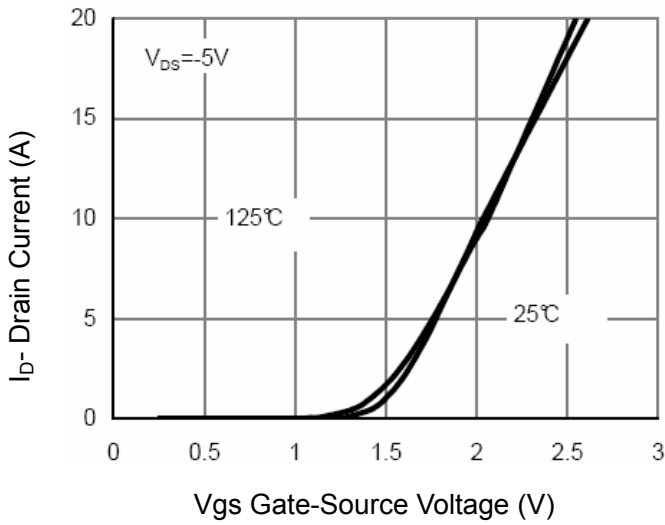
T<sub>J</sub>-Junction Temperature(°C)  
Figure 4 Drain Current



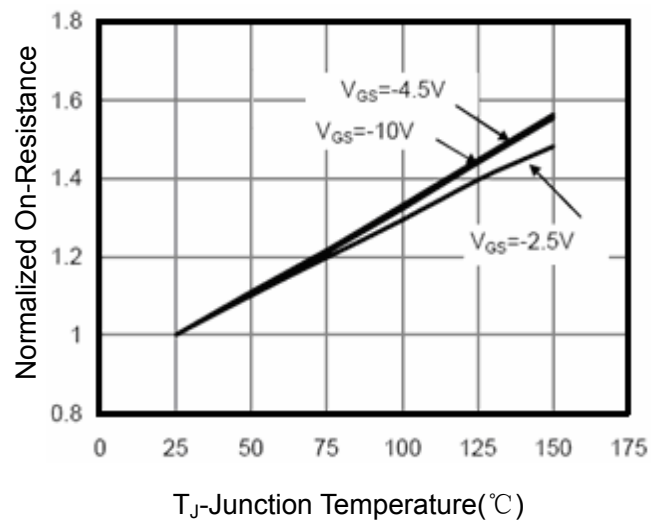
V<sub>ds</sub> Drain-Source Voltage (V)  
Figure 5 Output Characteristics



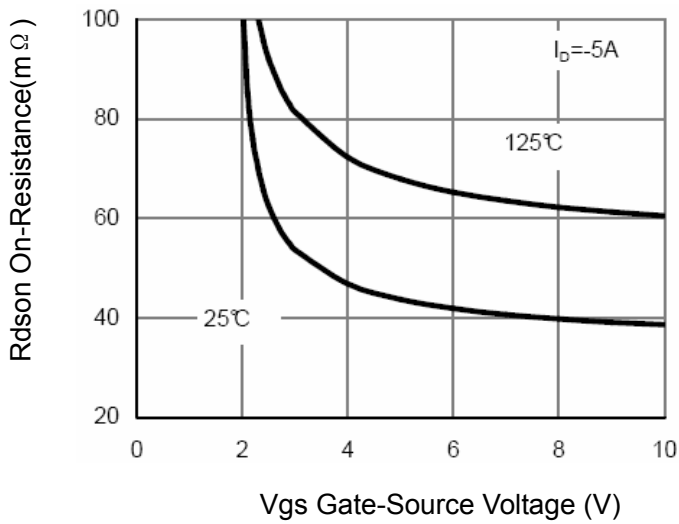
I<sub>D</sub>- Drain Current (A)  
Figure 6 Drain-Source On-Resistance



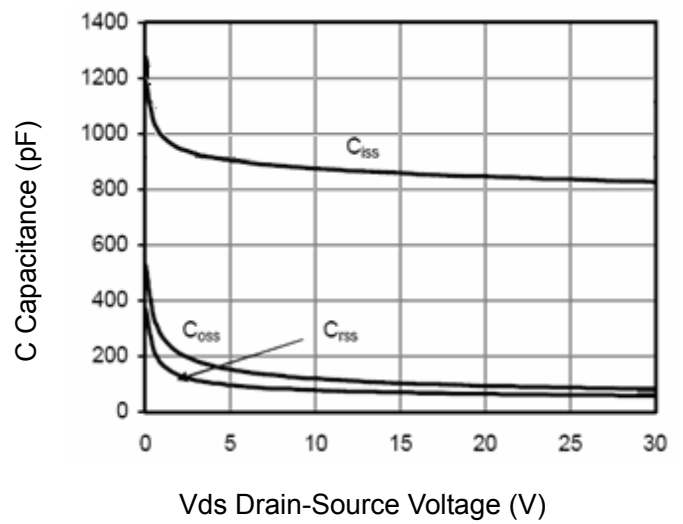
Vgs Gate-Source Voltage (V)  
Figure 7 Transfer Characteristics



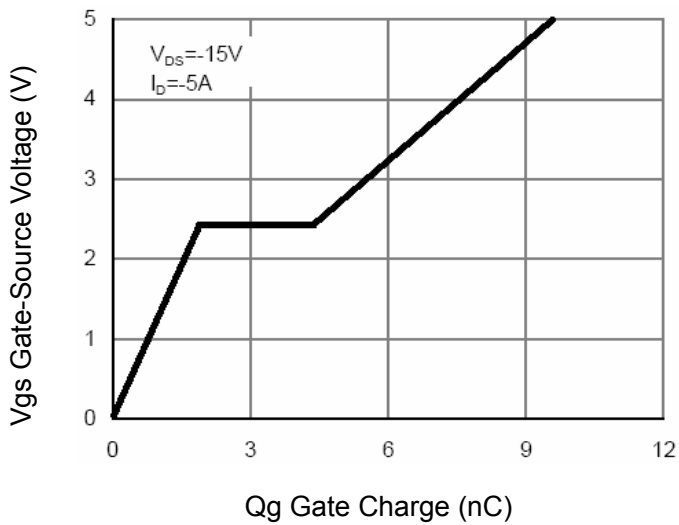
T<sub>J</sub>-Junction Temperature(°C)  
Figure 8 Drain-Source On-Resistance



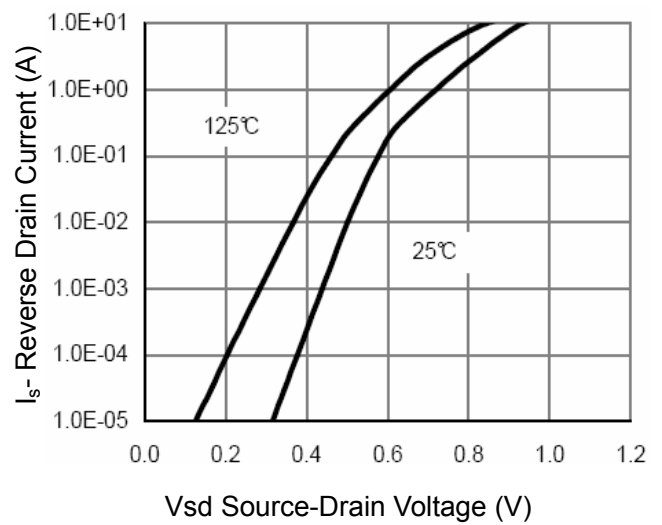
Vgs Gate-Source Voltage (V)  
Figure 9 Rdson vs Vgs



Vds Drain-Source Voltage (V)  
Figure 10 Capacitance vs Vds



Qg Gate Charge (nC)  
Figure 11 Gate Charge



Vsd Source-Drain Voltage (V)  
Figure 12 Source-Drain Diode Forward

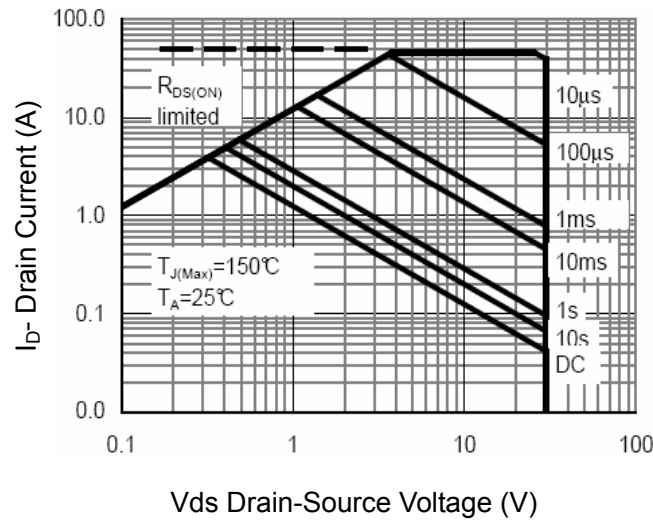


Figure 13 Safe Operation Area

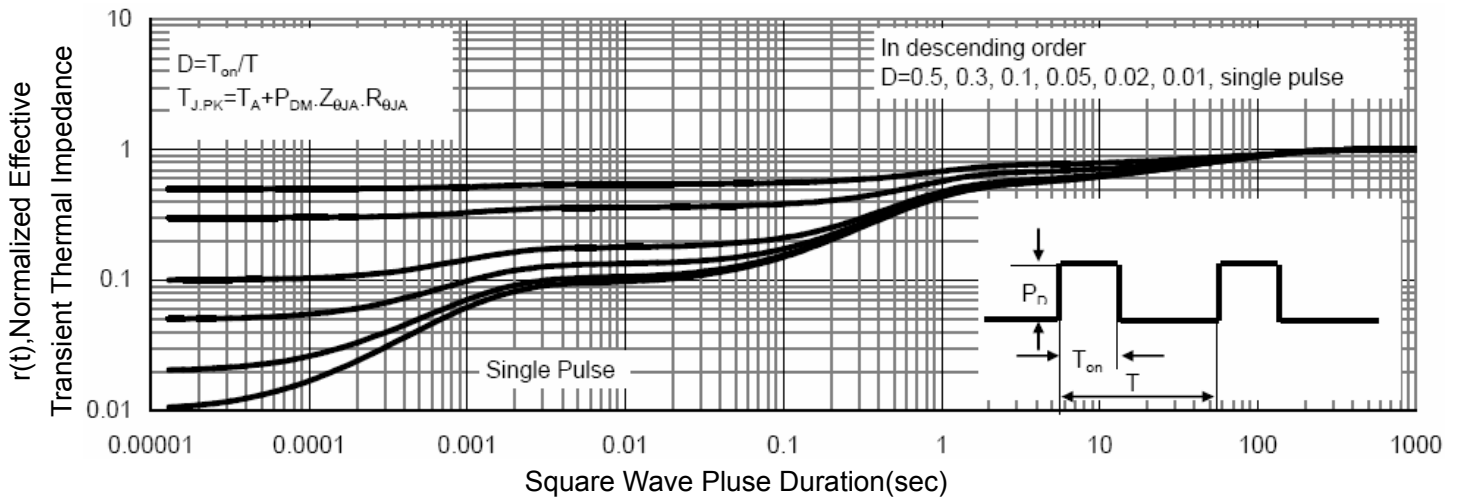
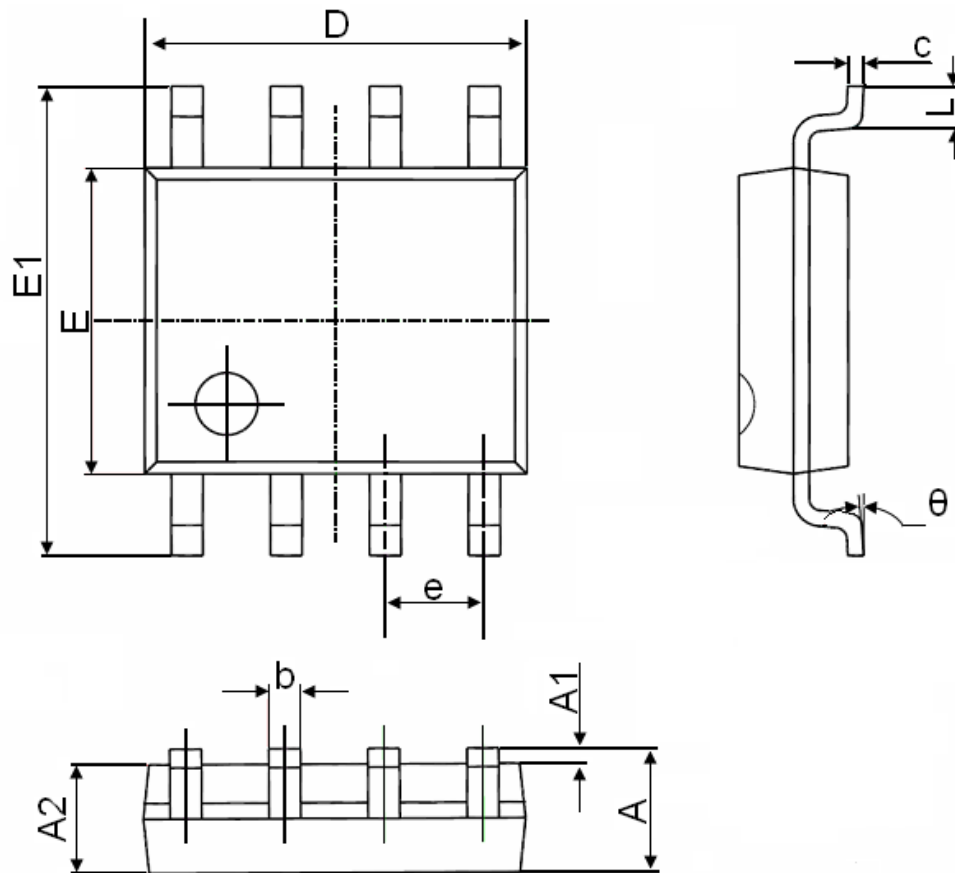


Figure 14 Normalized Maximum Transient Thermal Impedance

**SOP-8 Package Information**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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