

## NCE N-Channel Enhancement Mode Power MOSFET

### Description

The NCE0157A2 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

$$V_{DS} = 100V, I_D = 57A$$

$$R_{DS(ON)} < 17.5m\Omega @ V_{GS}=10V \quad (\text{Typ}:14.5m\Omega)$$

Special process technology for high ESD capability

High density cell design for ultra low  $R_{dson}$

Fully characterized avalanche voltage and current

Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 175	
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**Thermal Characteristic**

Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JC}$	0.94	/W
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**Electrical Characteristics ( $T_C=25$  unless otherwise noted)**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	100	110	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=100V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> <sup>(Note 3)</sup>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=28A$	-	14.5	17.5	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=25V, I_D=28A$	32	-	-	S
<b>Dynamic Characteristics</b> <sup>(Note 4)</sup>						
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $F=1.0MHz$	-	3969	-	PF
Output Capacitance	$C_{oss}$		-	182.5	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	160.2	-	PF
<b>Switching Characteristics</b> <sup>(Note 4)</sup>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, I_D=2A, R_L=15\Omega$ $V_{GS}=10V, R_G=2.5\Omega$	-	17	-	nS
Turn-on Rise Time	$t_r$		-	13	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	55	-	nS
Turn-Off Fall Time	$t_f$		-	16	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=30V, I_D=30A,$ $V_{GS}=10V$	-	146.1	-	nC
Gate-Source Charge	$Q_{gs}$		-	29.3	-	nC
Gate-Drain Charge	$Q_{gd}$		-	57.1	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note 3)</sup>	$V_{SD}$	$V_{GS}=0V, I_S=28A$	-	0.85	1.2	V
Diode Forward Current <sup>(Note 2)</sup>	$I_S$		-	-	57	A
Reverse Recovery Time	$t_{rr}$	$T_J = 25^\circ C, I_F = 28A$ $di/dt = 100A/\mu s$ <sup>(Note 3)</sup>	-	35	-	nS
Reverse Recovery Charge	$Q_{rr}$		-	58	-	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,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5. EAS condition  $T_J=25$ ,  $V_{DD}=50V, V_G$





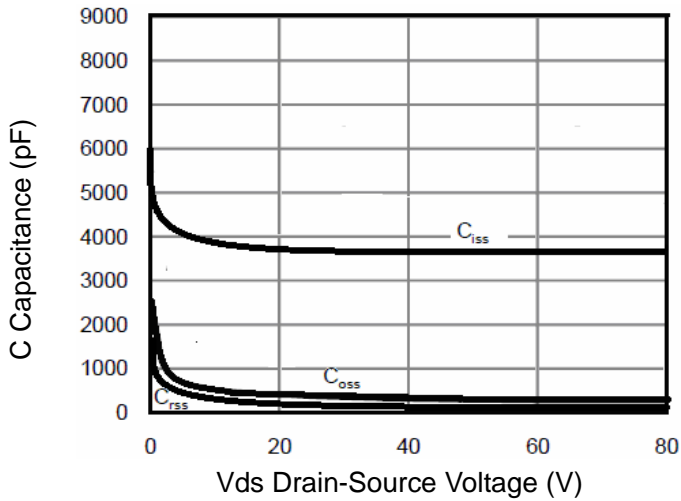


Figure 7 Capacitance vs Vds

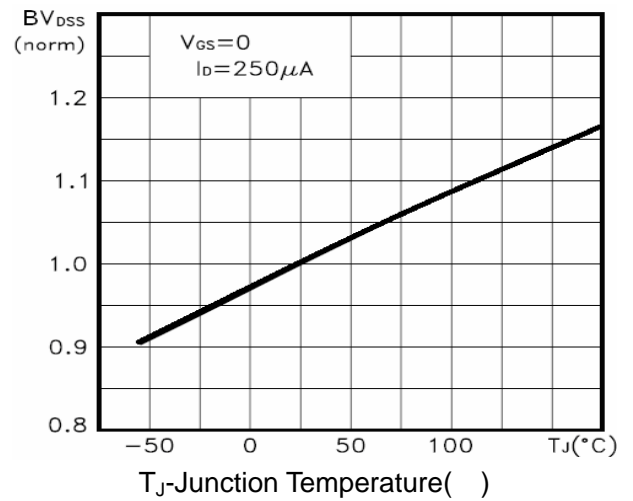


Figure 9  $BV_{DSS}$  vs Junction Temperature

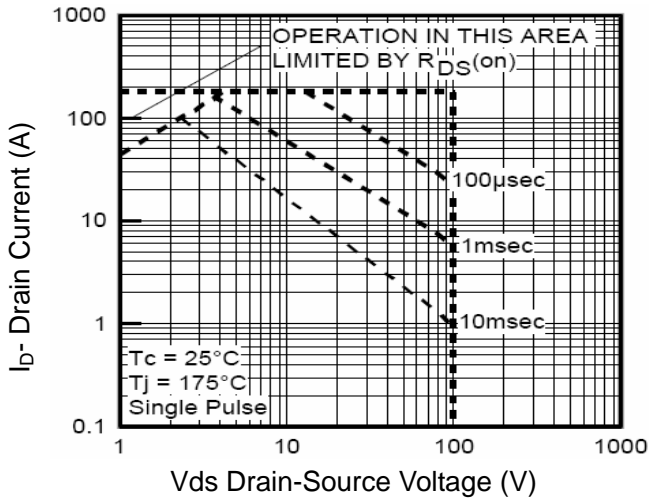


Figure 8 Safe Operation Area

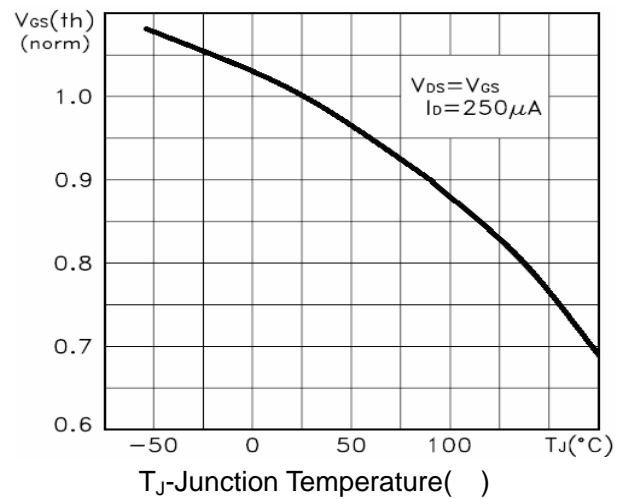


Figure 10  $V_{GS(th)}$  vs Junction Temperature

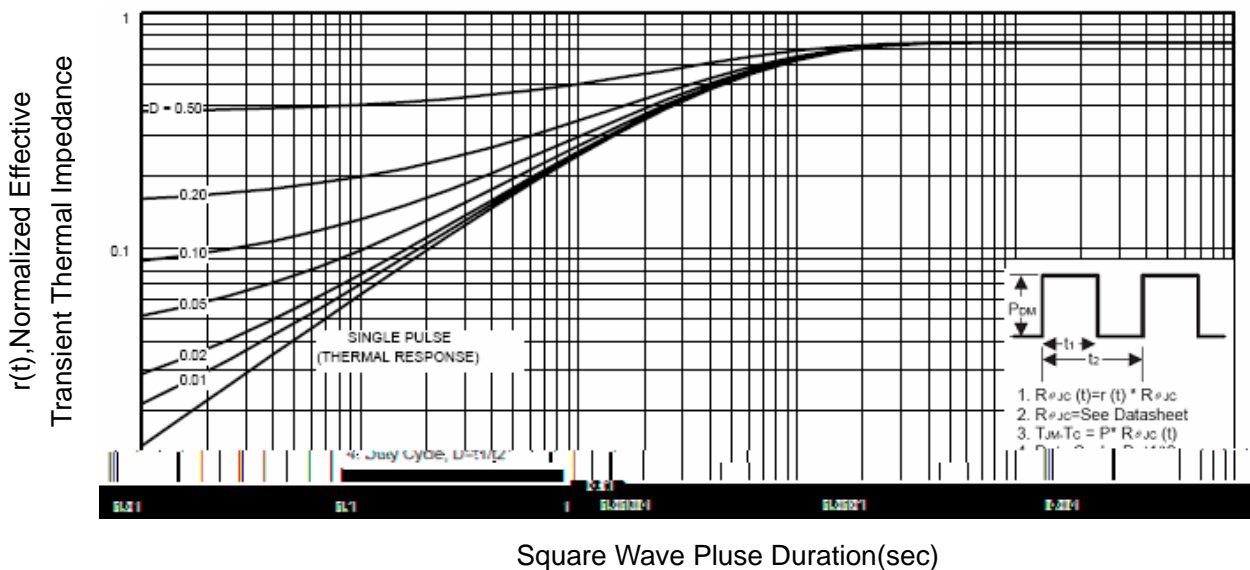
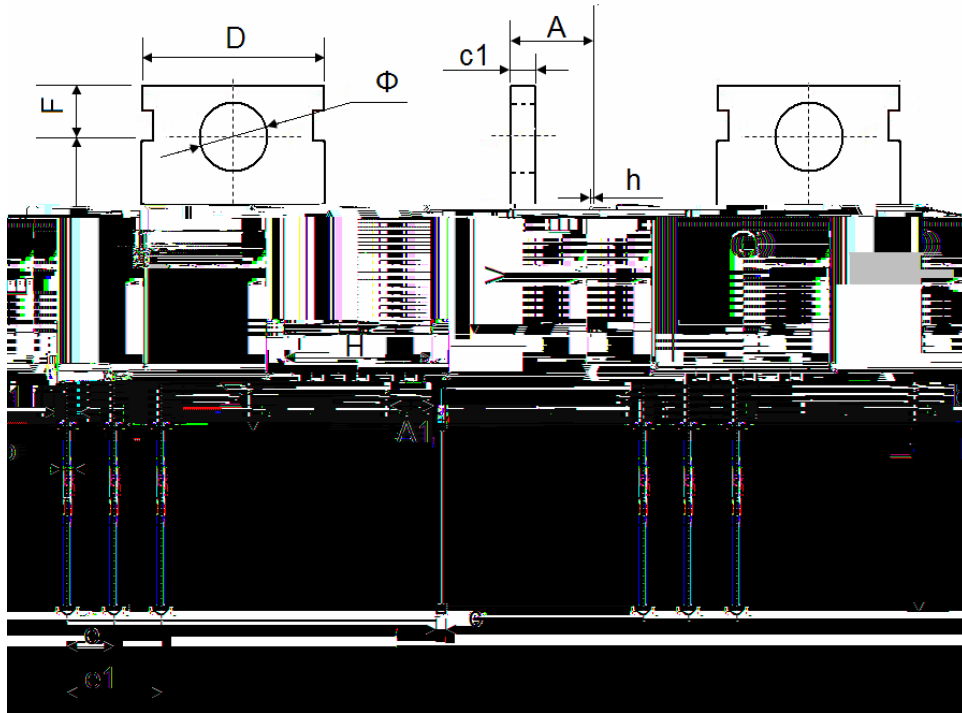


Figure 11 Normalized Maximum Transient Thermal Impedance

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


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	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
c	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
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	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.	
	3.400	3.800	0.134	0.150

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