

N-Channel Enhancement Mode Power MOSFET

General Description

The series of Power MOSFETs use advanced technology and design. This high voltage MOSFET fits Switched applications.

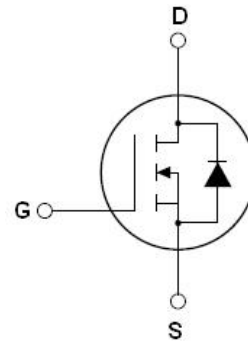
Features

- High speed switching
- Intrinsic capacitances and Qg minimized
- 100% Avalanche Tested

Application

- Switched applications

$V_{DS\ min@T_{jmax}}$	1650	V
$R_{DS(ON)TYP}$	5.5	Ω
I_D	3	A
Q_g	32	nC



Schematic diagram

Package Marking And Ordering Information

Device	Device Package	Marking
NCE3N150PF	TO-3PF	NCE3N150PF



TO-3PF

Table 1. Absolute Maximum Ratings ($T_J=25^\circ\text{C}$)

Parameter	Symbol	NCE3N150PF	Unit
Drain-Source Voltage ($V_{GS}=0V$)	V_{DS}	1500	V
Gate-Source Voltage ($V_{DS}=0V$) DC	V_{GS}	± 30	V
Continuous Drain Current at $T_c=25^\circ\text{C}$	$I_{D(DC)}$	3	A
Continuous Drain Current at $T_c=100^\circ\text{C}$	$I_{D(DC)}$	2.10	A
Pulsed drain current (Note 1)	$I_{DM(pluse)}$	9	A
Maximum Power Dissipation ($T_c=25^\circ\text{C}$)	P_D	88	W
Derate above 25°C		0.58	W/ $^\circ\text{C}$
Single pulse avalanche energy (Note 2)	E_{AS}	225	mJ
Single pulse avalanche current (Note 2)	I_{AS}	3	A
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55...+175	$^\circ\text{C}$

* limited by maximum junction temperature

Table 2. Thermal Characteristic

Parameter	Symbol	NCE3N150	Unit
Thermal Resistance, Junction-to-Case (Maximum)	R_{thJC}	1.7	$^{\circ}C/W$
Thermal Resistance, Junction-to-Ambient (Maximum)	R_{thJA}	50	$^{\circ}C/W$

Table 3. Electrical Characteristics ($T_J=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
On/off states						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=1mA$	1500			V
Zero Gate Voltage Drain Current($T_c=25^{\circ}C$)	I_{DSS}	$V_{DS}=1500V, V_{GS}=0V$			1	μA
Zero Gate Voltage Drain Current($T_c=125^{\circ}C$)	I_{DSS}	$V_{DS}=1500V, V_{GS}=0V$			100	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	3	4	5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=1.5A$		5.5	7.5	Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=40V, V_{GS}=0V,$ $F=1.0MHz$		1700		pF
Output Capacitance	C_{oss}			61		pF
Reverse Transfer Capacitance	C_{rss}			5.5		pF
Total Gate Charge	Q_g	$V_{DS}=1200V, I_D=1.5A,$ $V_{GS}=10V$		32		nC
Gate-Source Charge	Q_{gs}			8.7		nC
Gate-Drain Charge	Q_{gd}			12		nC
Intrinsic gate resistance	R_G	$f = 1 MHz$ open drain		2		Ω
Switching times						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=750V, I_D=1.5A,$ $R_G=3\Omega, V_{GS}=10V$		22		nS
Turn-on Rise Time	t_r			45		nS
Turn-Off Delay Time	$t_{d(off)}$			42		nS
Turn-Off Fall Time	t_f			58		nS
Source- Drain Diode Characteristics						
Source-drain current(Body Diode)	I_{SD}	$T_C=25^{\circ}C$			3	A
Pulsed Source-drain current(Body Diode)	I_{SDM}				9	A
Forward On Voltage	V_{SD}	$T_J=25^{\circ}C, I_{SD}=3A, V_{GS}=0V$		0.8	1.1	V
Reverse Recovery Time	t_{rr}	$T_J=25^{\circ}C, I_F=3A,$ $di/dt=100A/\mu s$		390		nS
Reverse Recovery Charge	Q_{rr}			2.2		μC
Peak Reverse Recovery Current	I_{rrm}			11		A

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature

2. $T_J=25^{\circ}C, V_{DD}=50V, V_G=10V, R_G=25\Omega$

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (curves)

Figure1. Safe operating area

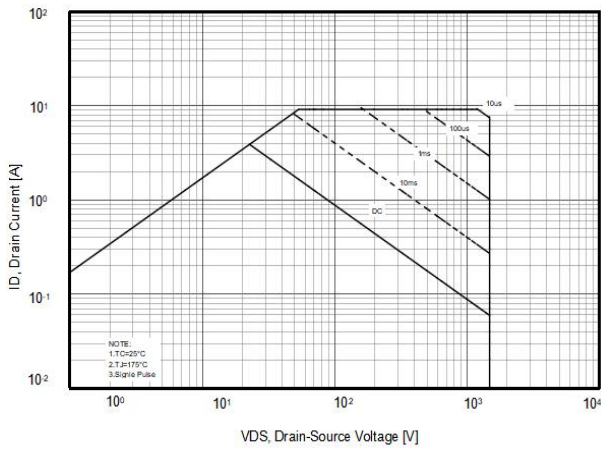


Figure2. Source-Drain Diode Forward Voltage

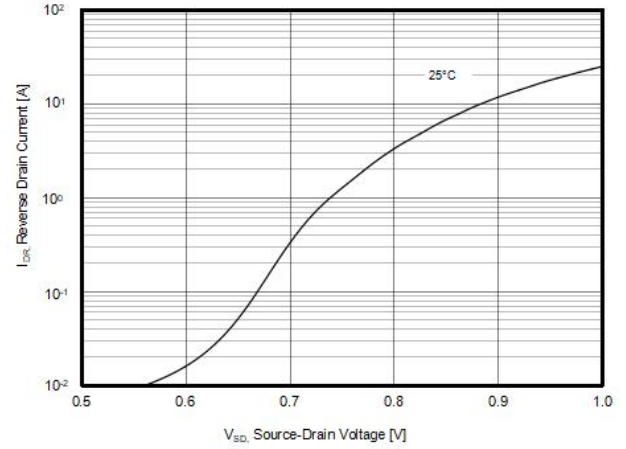


Figure3. $R_{DS(ON)}$ vs Junction Temperature

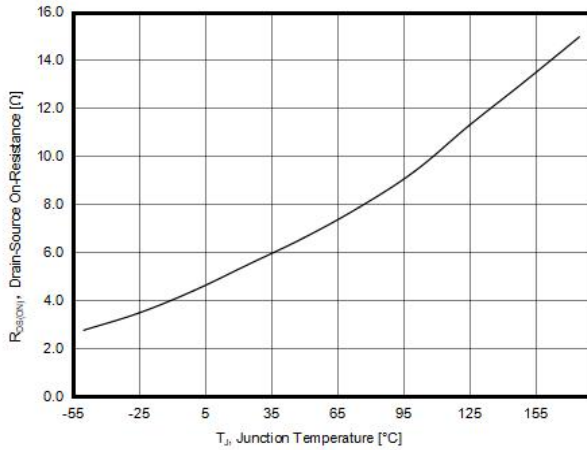


Figure4. BV_{DSS} vs Junction Temperature

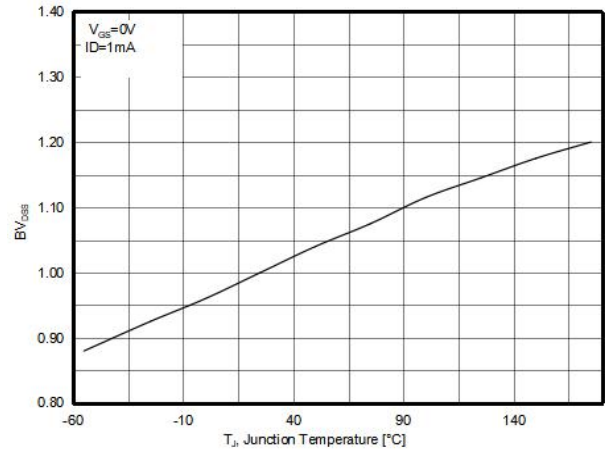


Figure5. Maximum I_D vs Junction Temperature

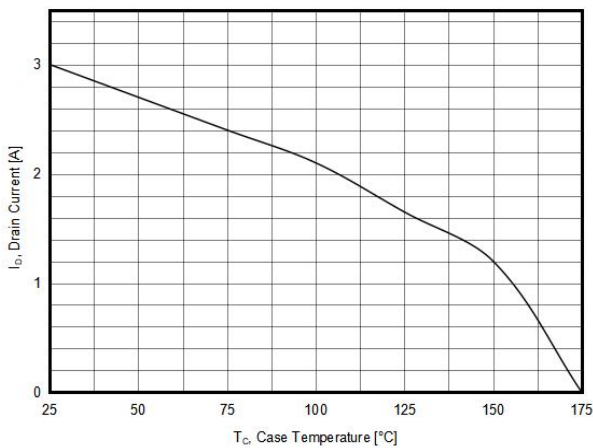


Figure6. Output characteristics

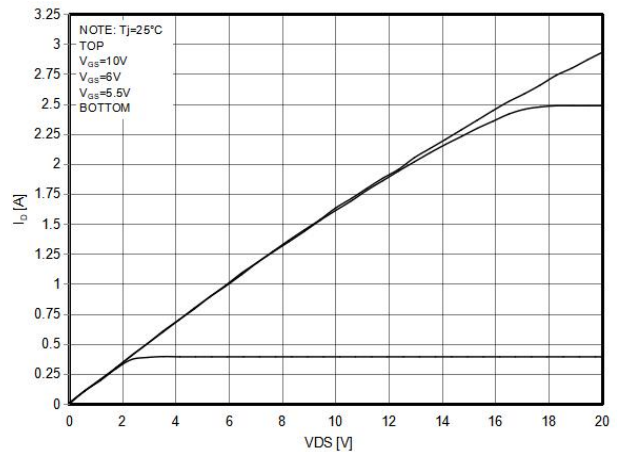


Figure7. Capacitance

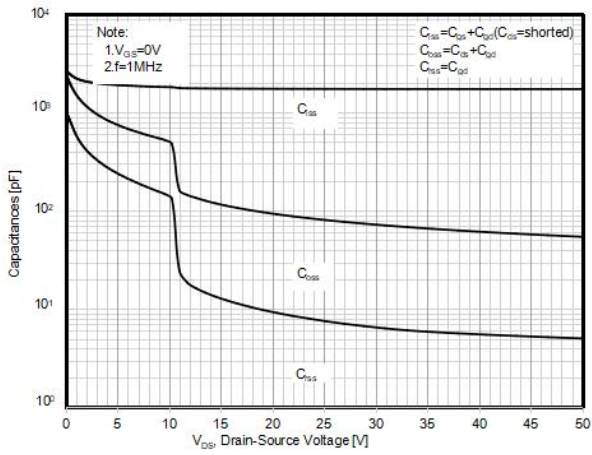


Figure8. Transfer characteristics

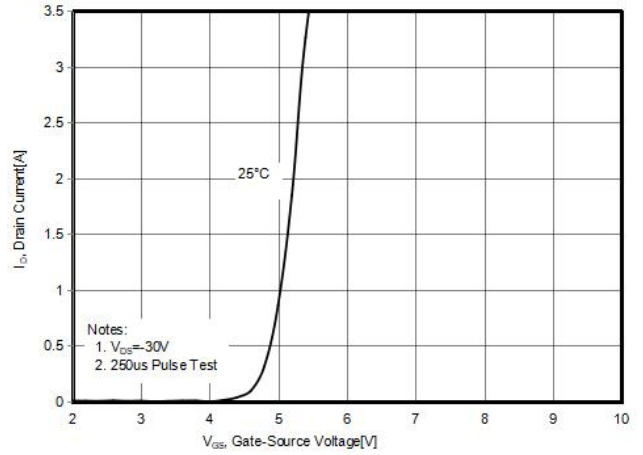


Figure9. Static drain-source on resistance

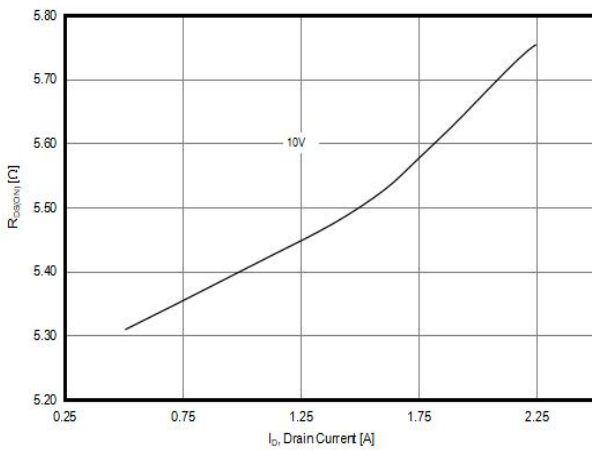
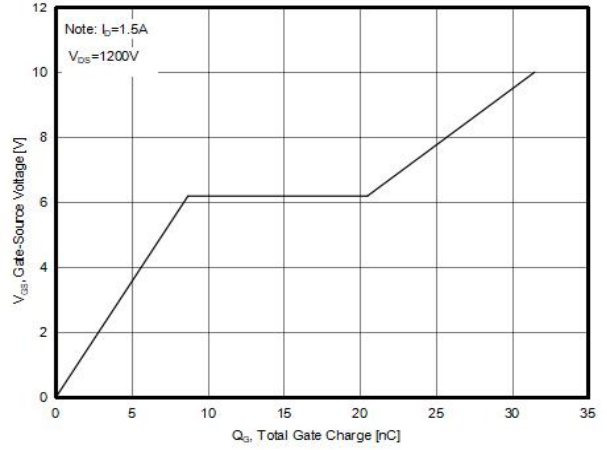
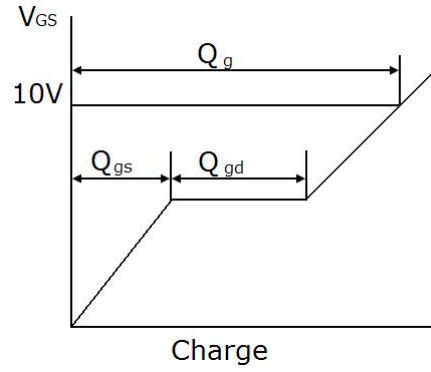
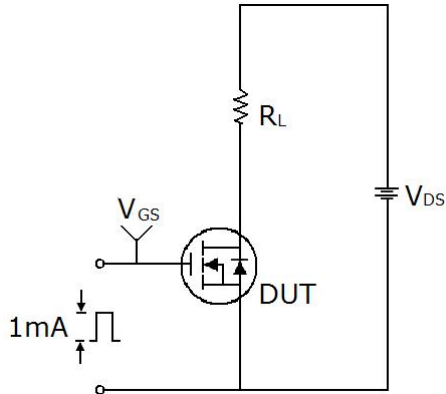


Figure9. Gate charge waveforms

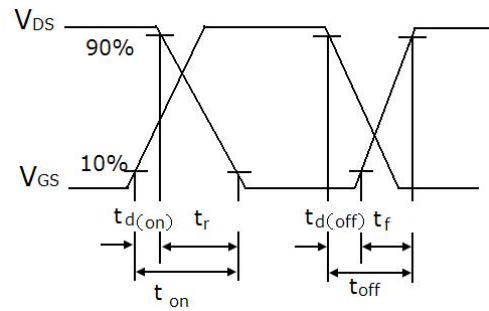
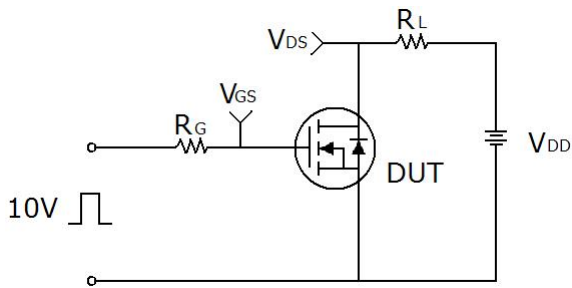


Test circuit

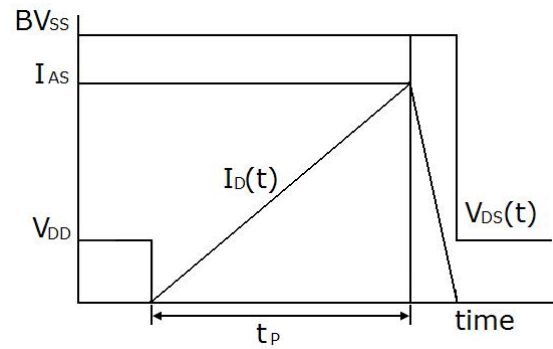
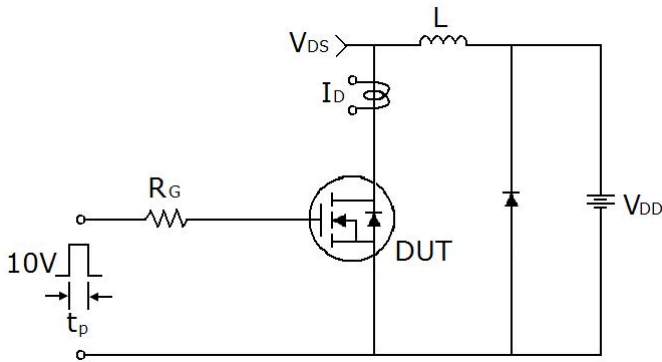
1) Gate charge test circuit & Waveform



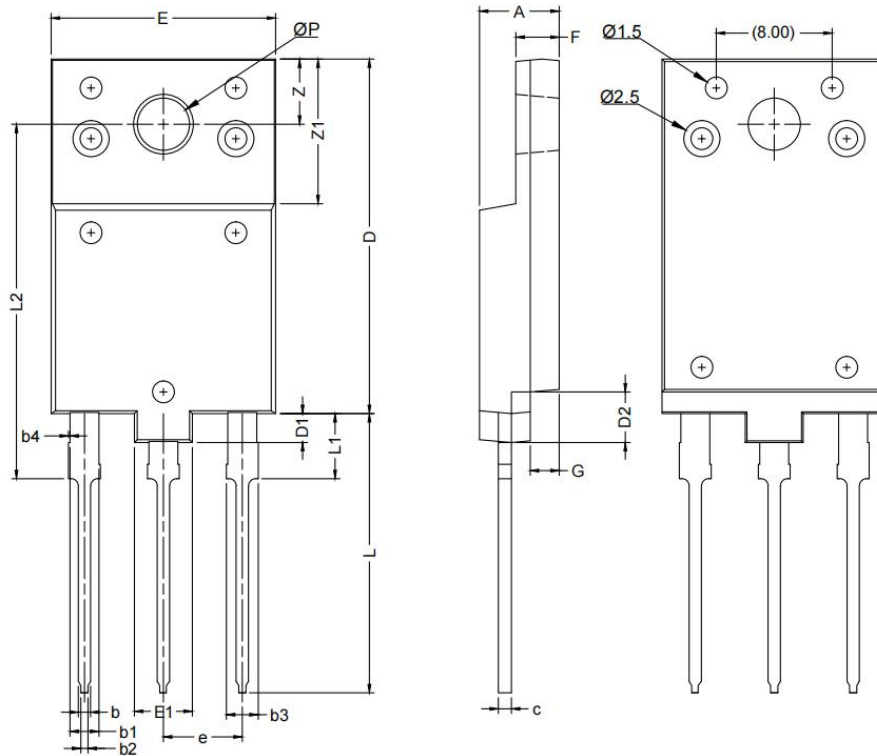
2) Switch Time Test Circuit:



3) Unclamped Inductive Switching Test Circuit & Waveforms



TO-3PF-B Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	5.300	5.700	0.209	0.224
b	0.650	0.950	0.026	0.037
b4		0.200		0.008
C	0.800	1.000	0.031	0.039
D	24.200	24.800	0.953	0.976
D1	1.800	2.200	0.071	0.087
D2	3.300	3.700	0.130	0.146
E	15.300	15.700	0.602	0.618
E1	3.800	4.200	0.150	0.165
F	2.800	3.200	0.110	0.126
e	5.450 BSC		0.215 BSC	
L	19.000	19.600	0.748	0.772
L1	4.200	4.800	0.165	0.189
L2	24.200	24.800	0.953	0.976
P	3.400	3.800	0.134	0.150
Z	4.300	4.700	0.169	0.185
Z1	9.700	10.300	0.382	0.406
G	1.800	2.200	0.071	0.087
S	3.100	3.500	0.122	0.138

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