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.

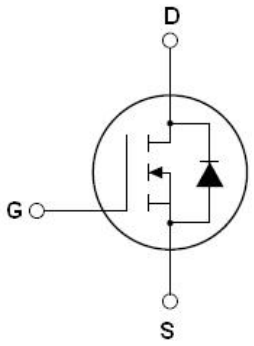
$V_{DS\ min@Tjmax}$	1650	V
$R_{DS(ON)TYP}$	5.5	Ω
ID	3	A
Qg	32	nC

Features

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

Application

- Switched applications



Schematic diagram

Package Marking And Ordering Information

Device	Device Package	Marking
NCE3N150F	TO-220F	NCE3N150F

TO-220F

Table 1. Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Value	Unit
Drain-Source Voltage (VGS=0V)	V_{DS}	1500	V
Gate-Source Voltage (VDS=0V) DC	V_{GS}	±30	V
Continuous Drain Current at Tc=25°C	$I_{D\ (DC)}$	3	A
Continuous Drain Current at Tc=100°C	$I_{D\ (DC)}$	2.1	A
Pulsed drain current (Note 1)	$I_{DM\ (pluse)}$	9	A
Maximum Power Dissipation(Tc=25°C) Derate above 25°C	P_D	48.3 0.32	W W/°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	°C

* limited by maximum junction temperature

Table 2. Thermal Characteristic

Parameter	Symbol	Value	Unit
Thermal Resistance，Junction-to-Case（Maximum）	R_{thJC}	3.1	°C /W
Thermal Resistance，Junction-to-Ambient （Maximum）	R_{thJA}	62.5	°C /W

Table 3. Electrical Characteristics (TA=25℃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(Tc=25℃)	I_{DSS}	V_{DS}=1500V,V_{GS}=0V			1	μA
Zero Gate Voltage Drain Current(Tc=125℃)	I_{DSS}	V_{DS}=1500V,V_{GS}=0V			100	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±30V,V_{DS}=0V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	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_{lss}	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=3Ω,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°C			3	A
Pulsed Source-drain current(Body Diode)	I_{SDM}				9	A
Forward On Voltage	V_{SD}	Tj=25°C,I_{SD}=3A,V_{GS}=0V		0.8	1.1	V
Reverse Recovery Time	t_{rr}	Tj=25°C,I_F=3A, di/dt=100A/μs		390		nS
Reverse Recovery Charge	Q_{rr}			2.2		uC
Peak Reverse Recovery Current	I_{rrm}			11		A

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

2. Tj=25℃,VDD=50V,VG=10V, R_G=25Ω

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (curves)

Figure1. Safe operating area

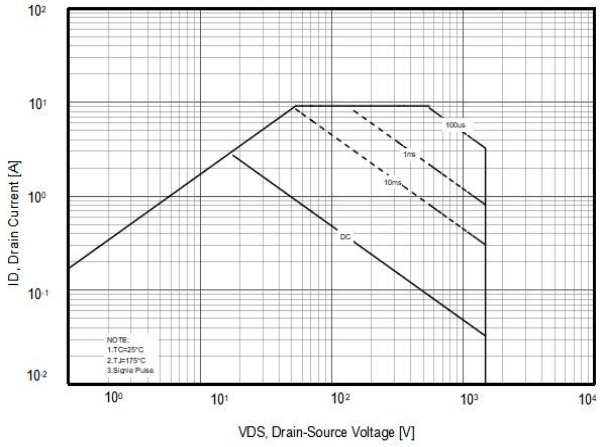


Figure2. Source-Drain Diode Forward Voltage

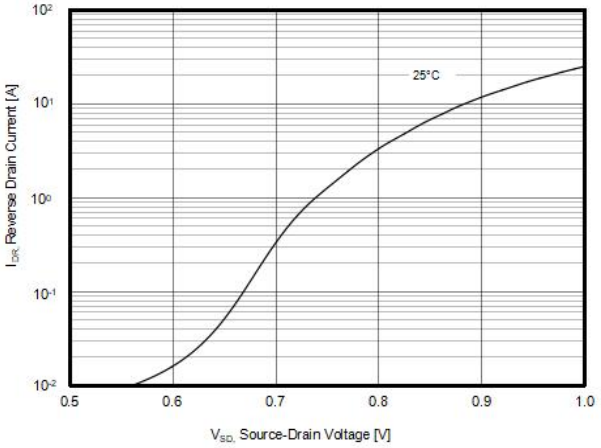


Figure3. $R_{DS(ON)}$ vs Junction Temperature

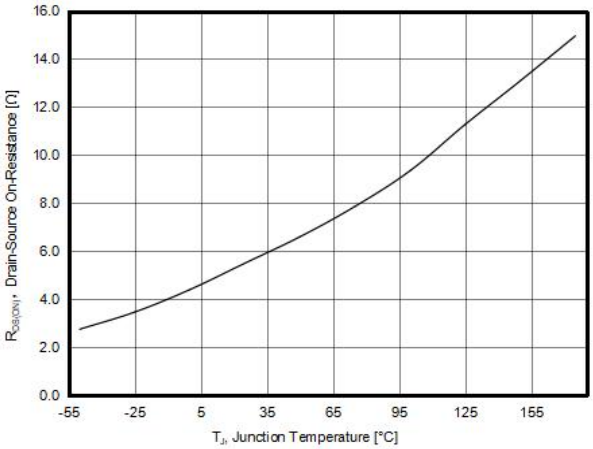


Figure4. BV_{DSS} vs Junction Temperature

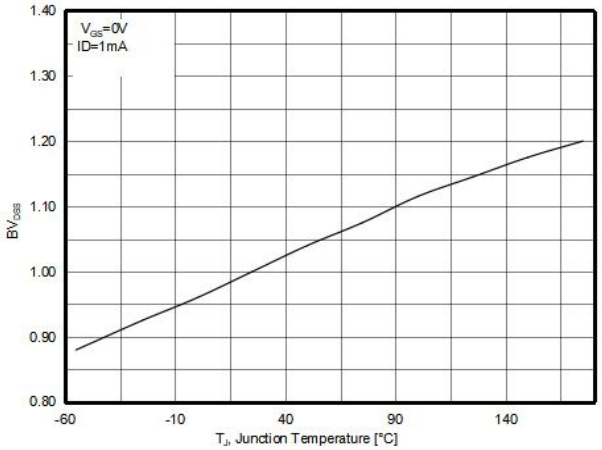


Figure5. Maximum I_D vs Junction Temperature

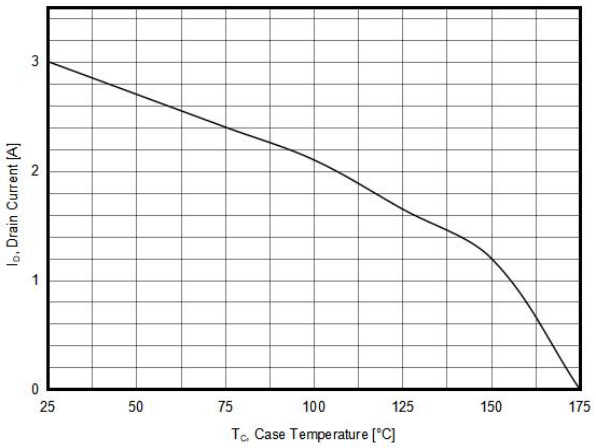


Figure6. Output characteristics

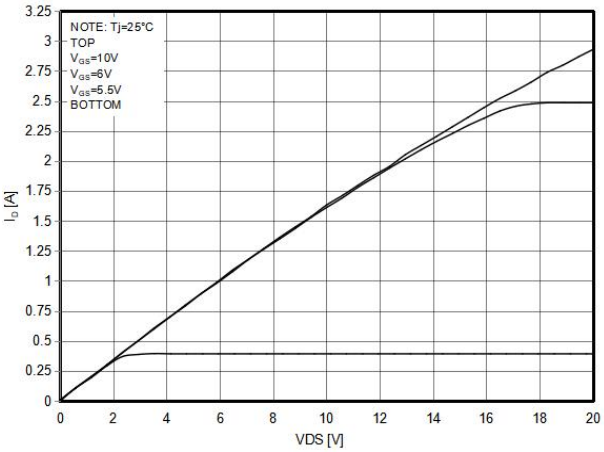


Figure7. Capacitance

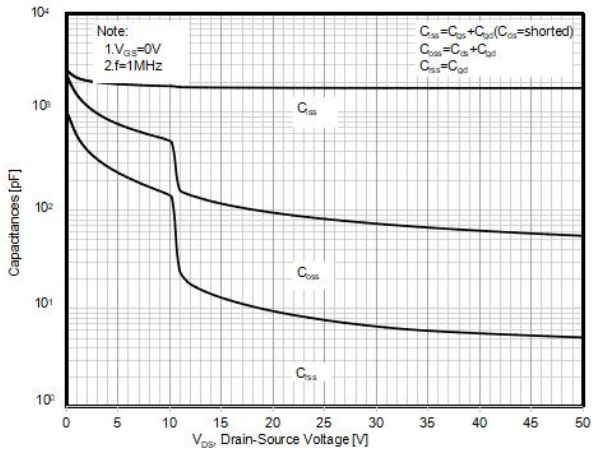


Figure8. Transfer characteristics

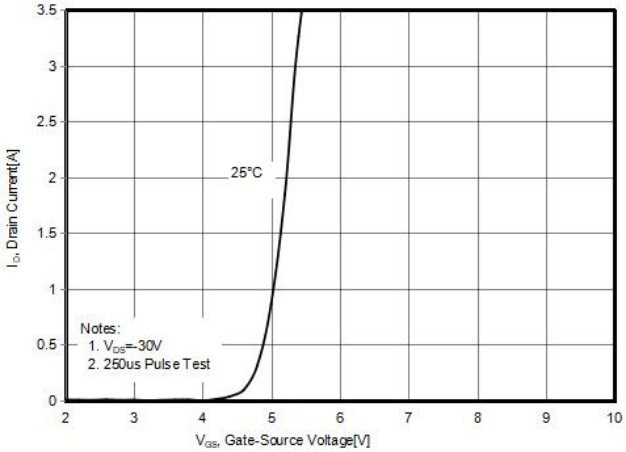


Figure9. Static drain-source on resistance

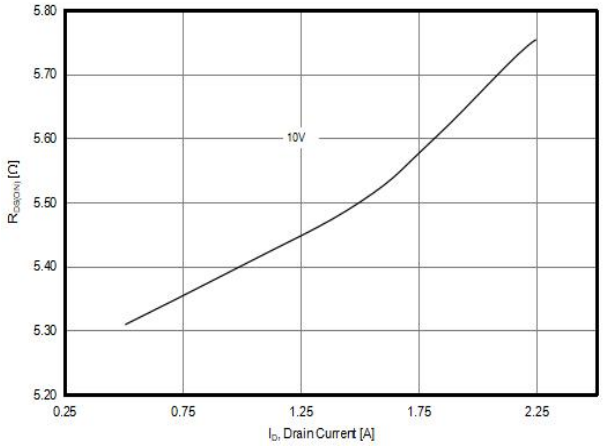
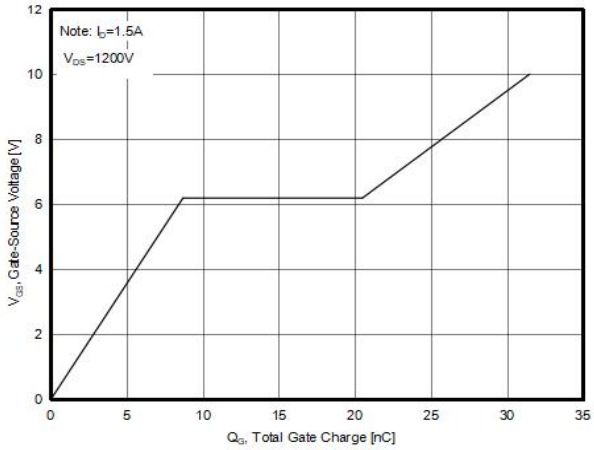
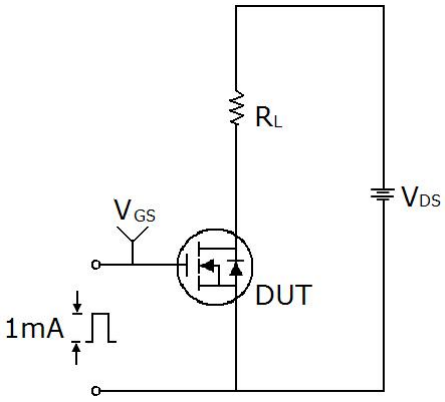


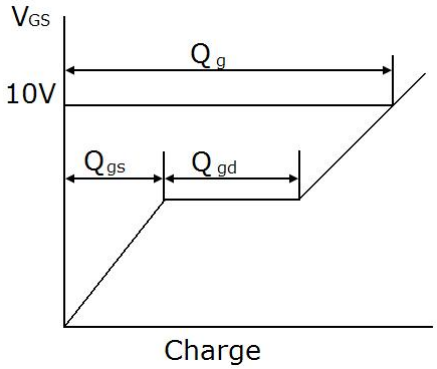
Figure9. Gate charge waveforms



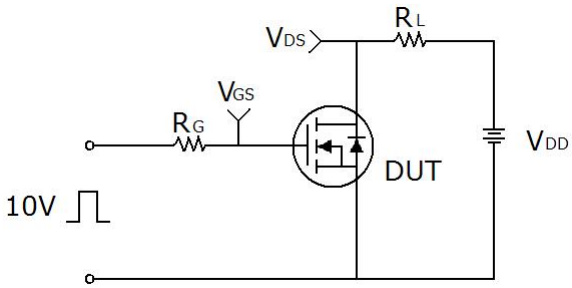
Test circuit

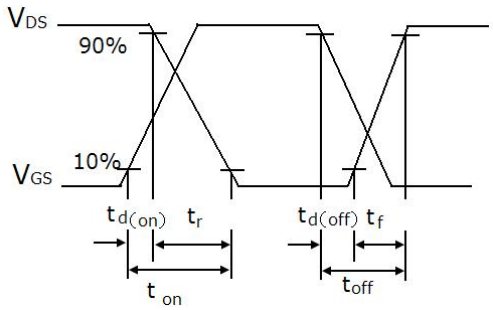
1）Gate charge test circuit & Waveform



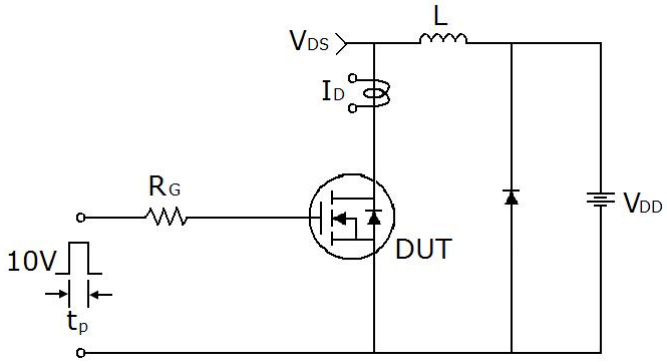


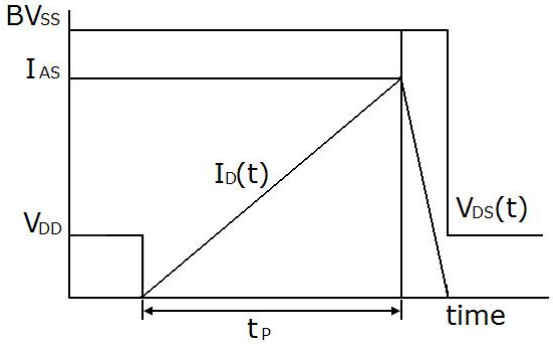
2）Switch Time Test Circuit：



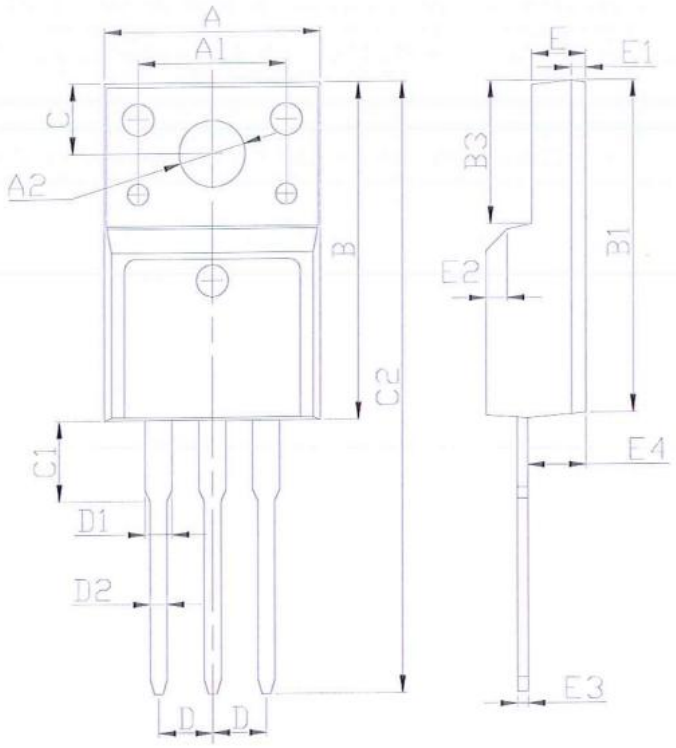


3）Unclamped Inductive Switching Test Circuit & Waveforms





TO-220F-L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	9.86	10.46	0.387	0.411
A1	6.80	7.20	0.267	0.283
A2	2.92	3.32	0.115	0.130
A3	9.40	10.00	0.369	0.393
B	15.40	16.40	0.605	0.644
B1	15.10	16.10	0.593	0.633
B2	4.40	5.00	0.173	0.196
B3	6.40	7.00	0.251	0.275
C	3.05	3.55	0.120	0.139
C1	2.95	3.55	0.116	0.139
C2	28.20	29.20	1.108	1.147
D	2.54 BSC		0.100 BSC	
D1	--	1.47	--	0.058
D2	0.60	1.00	0.024	0.039
E	2.30	2.80	0.090	0.110
E1	0.45	0.95	0.018	0.037
E2	45.0°		45.00°	
E3	0.30	0.70	0.012	0.028
E4	2.45	3.05	0.096	0.120

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