NCE N-Channel Enhancement Mode Power MOSFET

Description

The NCE60H10F 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 Feature

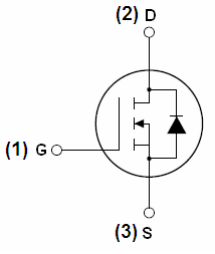
- V_{DS} =60V,I_D =100A
  $R_{DS(ON)}$ < 6.5mΩ @ V_{GS}=10V (Typ:5.7mΩ)
- Special process technology for high ESD capability
- High density cell design for ultra low Rdson
- Fully characterized Avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

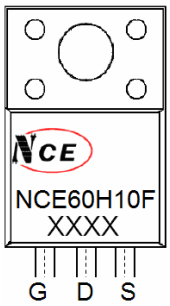
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

100% UIS TESTED!

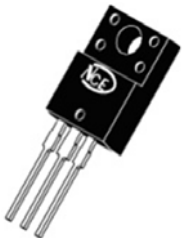
100% ΔVds TESTED!



Schematic diagram



Marking and pin assignment



TO-220F top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE60H10F	NCE60H10F	TO-220F	-	-	-

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	100	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	70	A
Pulsed Drain Current	I_{DM}	320	A
Maximum Power Dissipation	P_D	45	W
Derating factor		0.3	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	550	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case (Note 2)	$R_{\theta JC}$	3.3	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

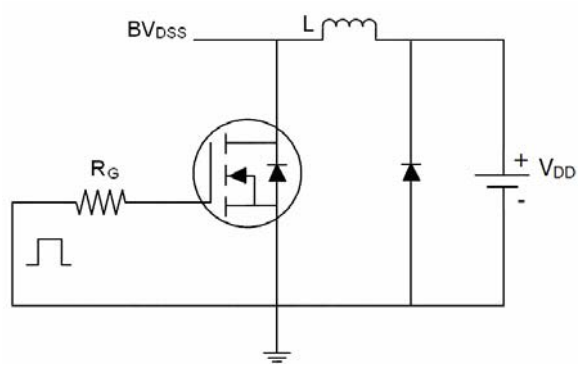
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	60	65	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	2	3	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=40A	-	5.7	6.5	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=40A	-	50	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=30V,V_{GS}=0V, F=1.0MHz	4037	4750	5460	PF
Output Capacitance	C_{oss}		336	396	455	PF
Reverse Transfer Capacitance	C_{rss}		260	339	389	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V,V_{GS}=10V,R_{GEN}=2.5Ω	-	16.8	-	nS
Turn-on Rise Time	t_r		-	10.8	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	55	-	nS
Turn-Off Fall Time	t_f		-	13.6	-	nS
Total Gate Charge	Q_g	V_{DS}=30V,I_D=40A, V_{GS}=10V	-	94.8	-	nC
Gate-Source Charge	Q_{gs}		-	17.3	-	nC
Gate-Drain Charge	Q_{gd}		-	33.8	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=40A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S	-	-	-	90	A
Reverse Recovery Time	t_{rr}	TJ = 25°C, IF = 40A di/dt = 100A/μs (Note3)	-	38	-	nS
Reverse Recovery Charge	Qrr		-	53	-	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

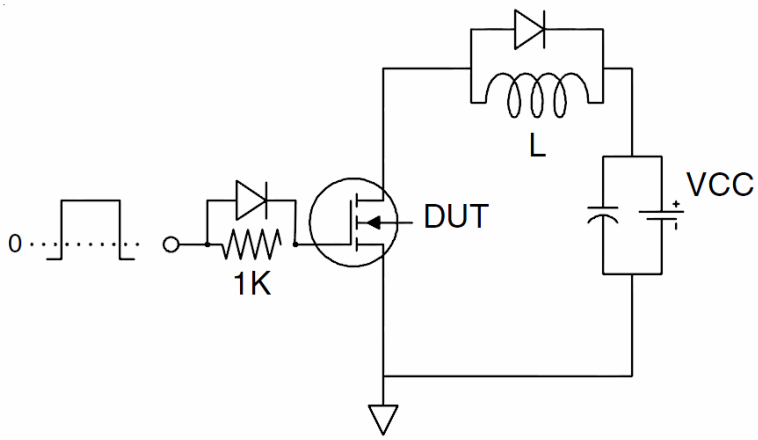
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition：Tj=25℃,V_{DD}=30V,V_G=10V,L=0.5mH,Rg=25Ω

Test circuit

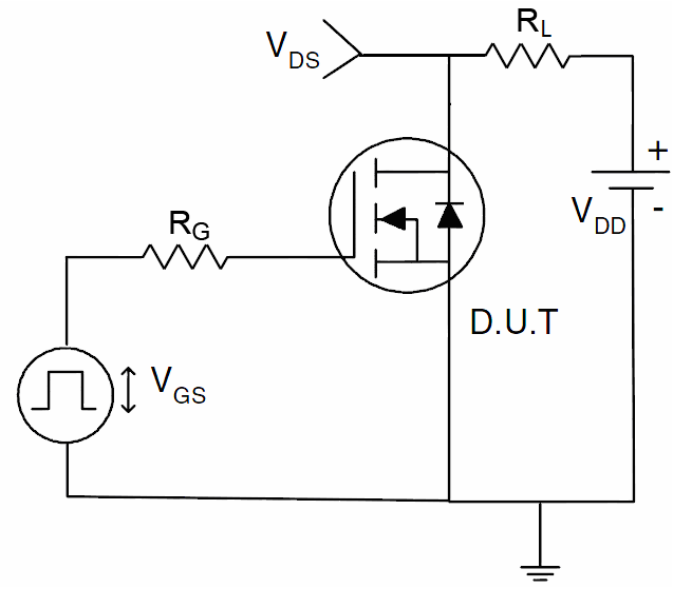
1）E_{AS} test Circuits



2）Gate charge test Circuit:



3）Switch Time Test Circuit:



Typical Electrical and Thermal Characteristics (Curves)

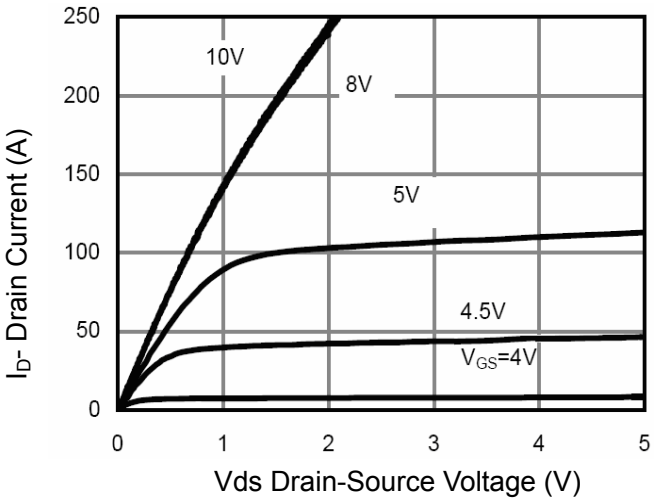


Figure 1 Output Characteristics

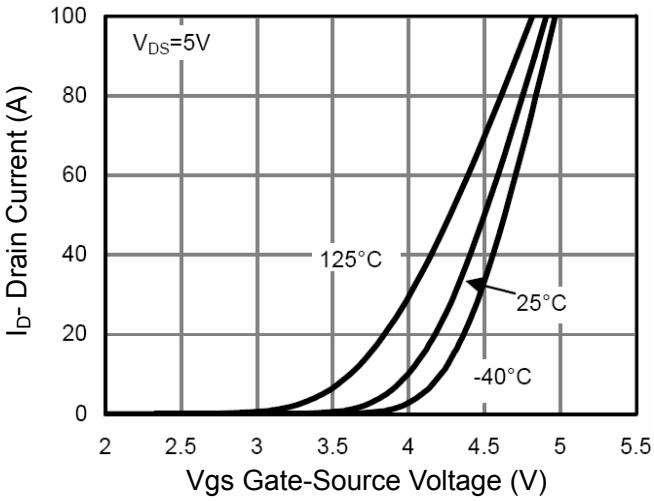


Figure 2 Transfer Characteristics

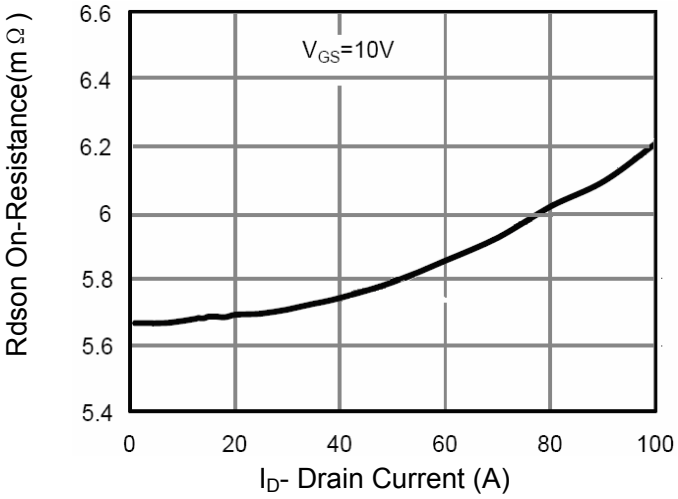


Figure 3 Rdson- Drain Current

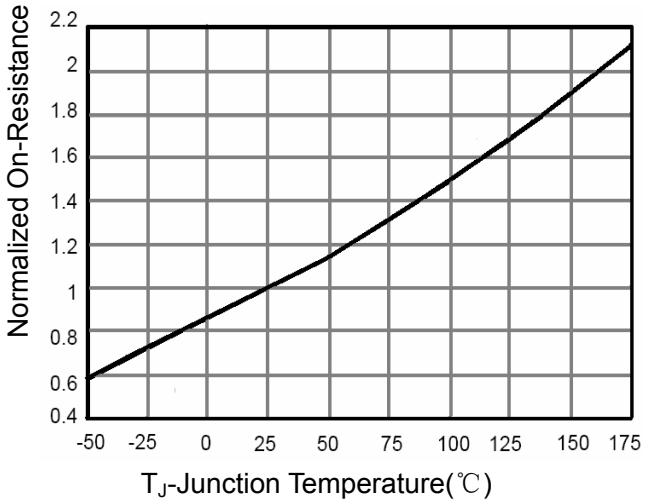


Figure 4 Rdson-JunctionTemperature

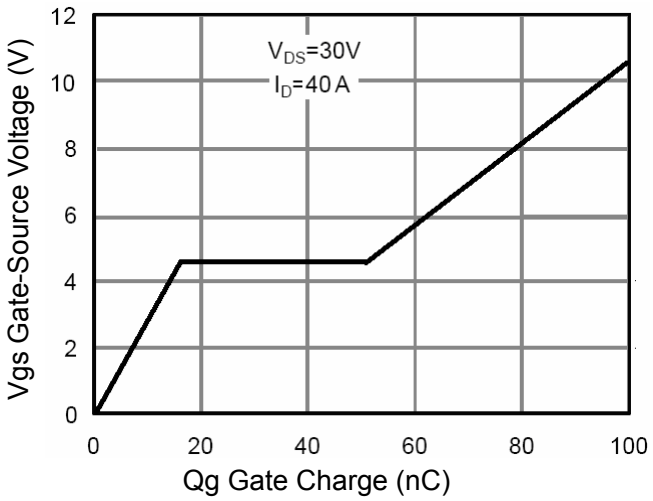


Figure 5 Gate Charge

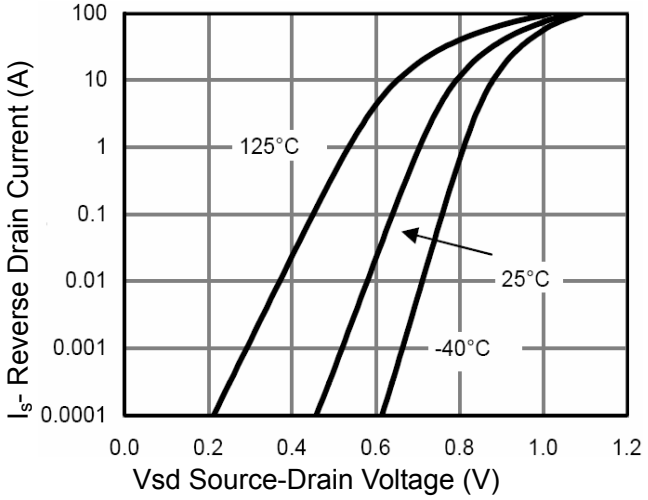


Figure 6 Source- Drain Diode Forward

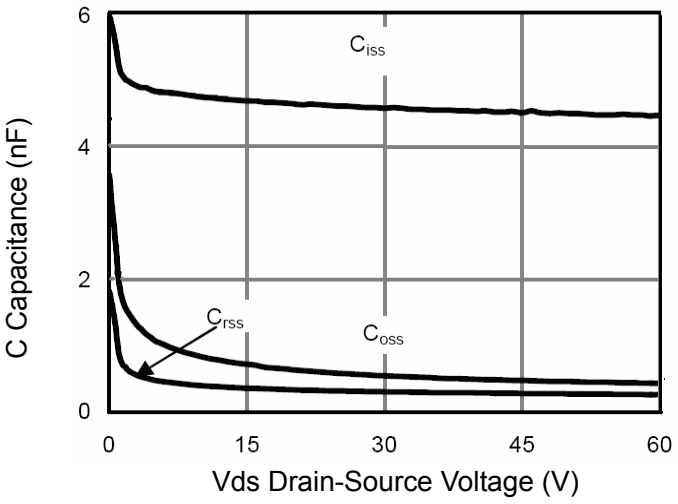


Figure 7 Capacitance vs Vds

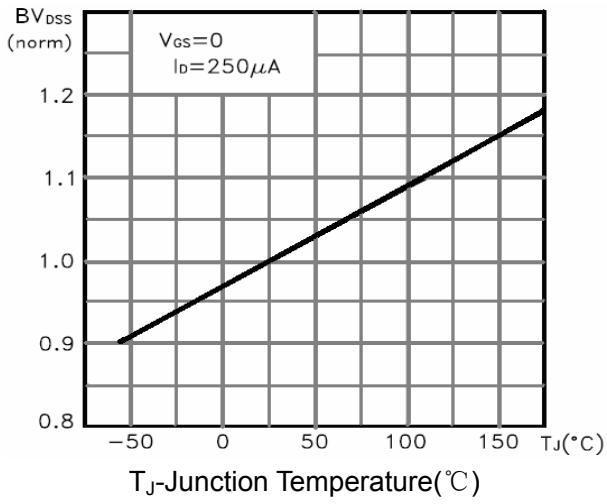


Figure 9 BV_{DSS} vs Junction Temperature

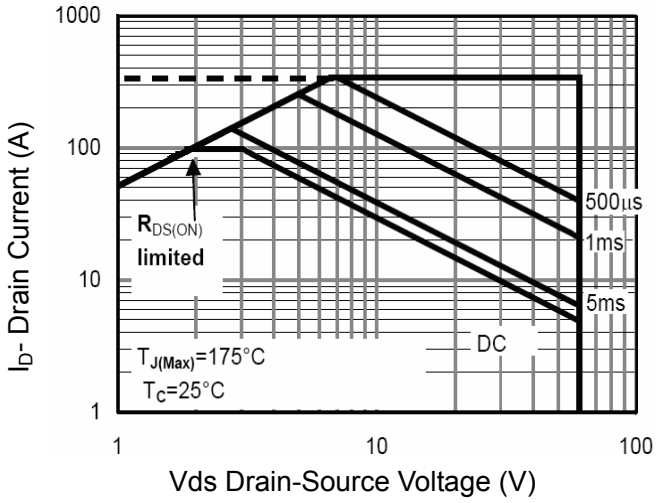


Figure 8 Safe Operation Area

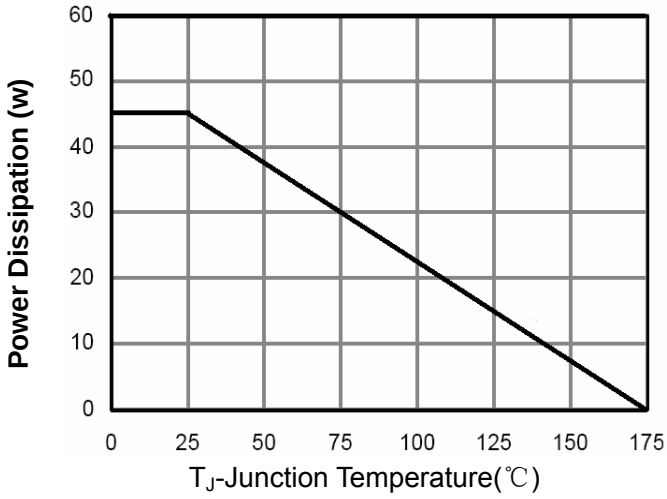


Figure 10 Power De-rating

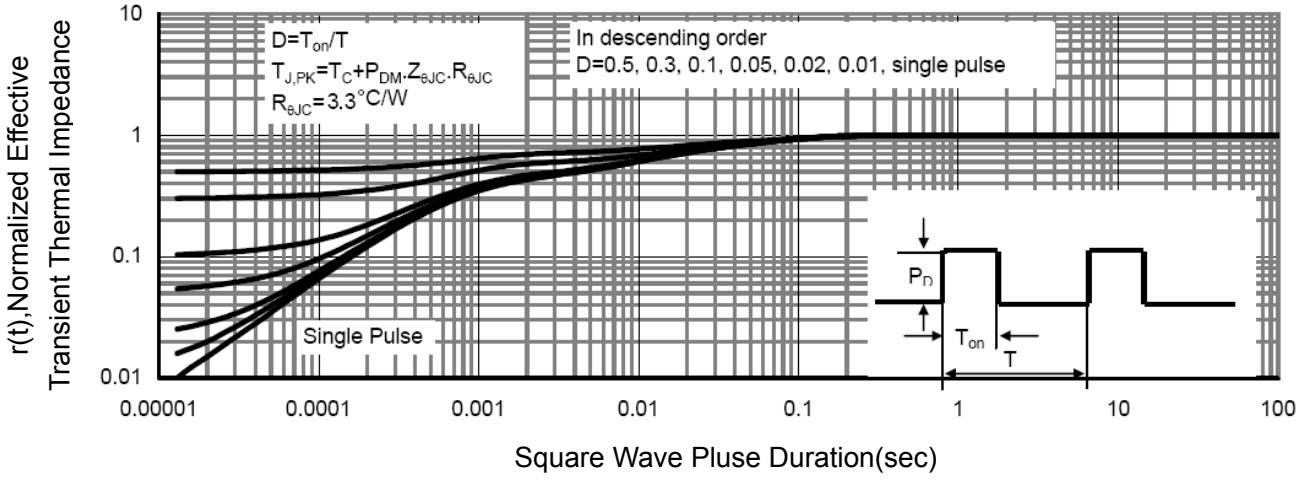
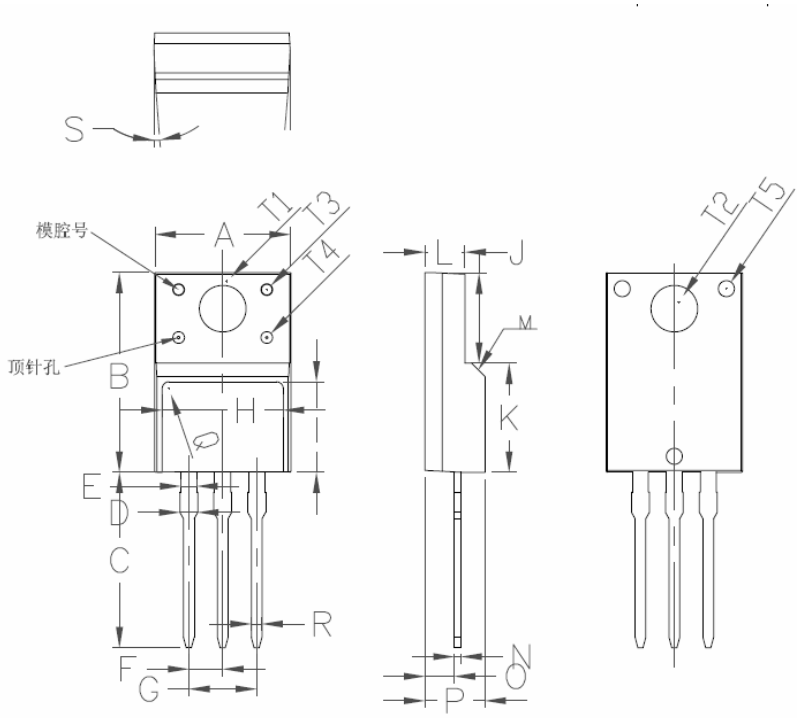


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220F Package Information



Symbol	Dimensions In Millimeters		
	Min.	Non	Max.
A	9.96	10.16	10.36
B	15.67	15.87	16.07
C	13.14	13.34	13.54
D	1.20	1.30	1.40
E		1.20	
F		2.54	
G		5.08	
H	7.60	7.80	8.00
I	7.10	7.30	7.50
J	6.48	6.68	6.88
K	8.99	9.19	9.39
L	2.34	2.54	2.74
N	0.49	0.50	0.52
O	2.15	2.35	2.55
P	4.50	4.70	4.90
T1		3.45	
T2		3.18	
T3		1.50	
T4		1.20	
T5		1.50	
R	0.77	0.80	0.83

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