NCE N-Channel Enhancement Mode Power MOSFET

Description

The NCE60H18 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications.

General Features

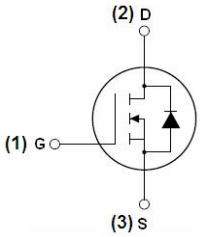
- V_{DS} =60V,I_D =180A
  $R_{DS(ON)}$ < 3mΩ @ V_{GS}=10V (Typ:2.5mΩ)
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Special designed for convertors and power controls
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

Application

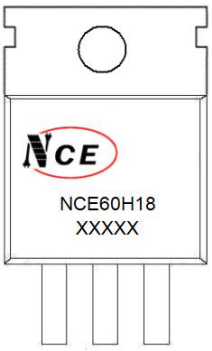
- Power switching application
- Hard switched and High frequency circuits
- Uninterruptible power supply

100% UIS TESTED!

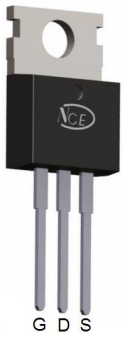
100% ΔVds TESTED!



Schematic diagram



Marking and pin assignment



TO-220-3L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE60H18	NCE60H18	TO-220-3L	-	-	-

Absolute Maximum Ratings (T_A=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	180	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	126	A
Pulsed Drain Current	I_{DM}	540	A
Maximum Power Dissipation	P_D	200	W
Derating factor		1.33	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	1730	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case (Note 2)	$R_{\theta JC}$	0.75	℃/W

Electrical Characteristics (T_A=25℃unless otherwise noted)

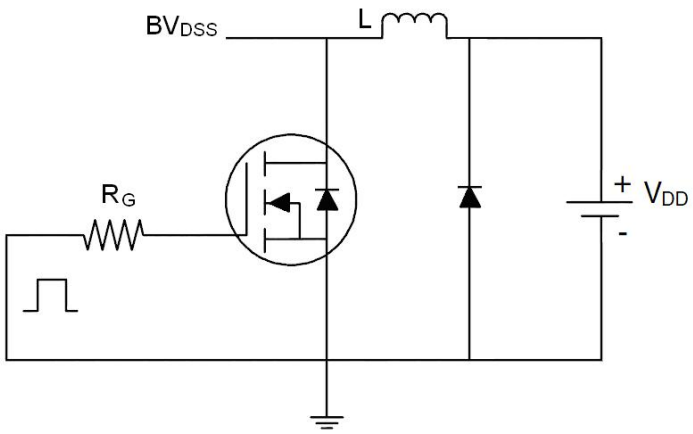
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 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=20A	-	2.5	3	mΩ
Forward Transconductance	g_{FS}	V_{DS}=20V,I_D=20A	-	60	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=30V,V_{GS}=0V, F=1.0MHz	-	9840	-	PF
Output Capacitance	C_{oss}		-	820	-	PF
Reverse Transfer Capacitance	C_{rss}		-	662	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	VDD=30V,RL=1.5Ω RG=2.5Ω,VGS=10V	-	40	-	nS
Turn-on Rise Time	t_r		-	25	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	110	-	nS
Turn-Off Fall Time	t_f		-	30	-	nS
Total Gate Charge	Q_g	V_{DS}=30V,I_D=20A, V_{GS}=10V	-	200	-	nC
Gate-Source Charge	Q_{gs}		-	46	-	nC
Gate-Drain Charge	Q_{gd}		-	60	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=20A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	180	A
Reverse Recovery Time	t_{rr}	Tj=25℃,I_F=100A di/dt=100A/μs (Note3)	-		60	nS
Reverse Recovery Charge	Qrr		-		110	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

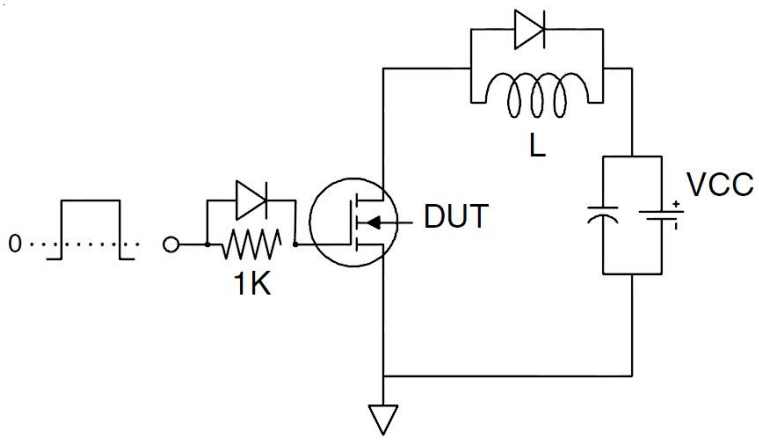
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition：Tj=25℃,V_{DD}=30V,V_G=10V,L=0.5mH,Rg=25Ω

Test Circuit

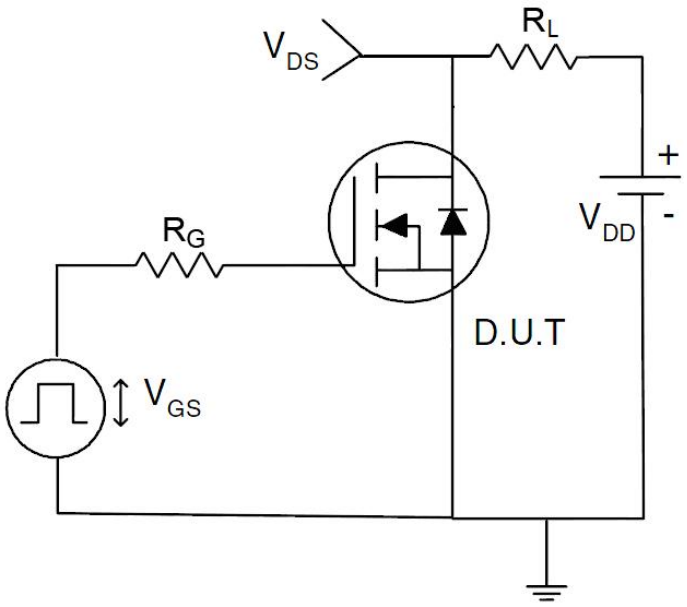
1) E_{AS} Test Circuits



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

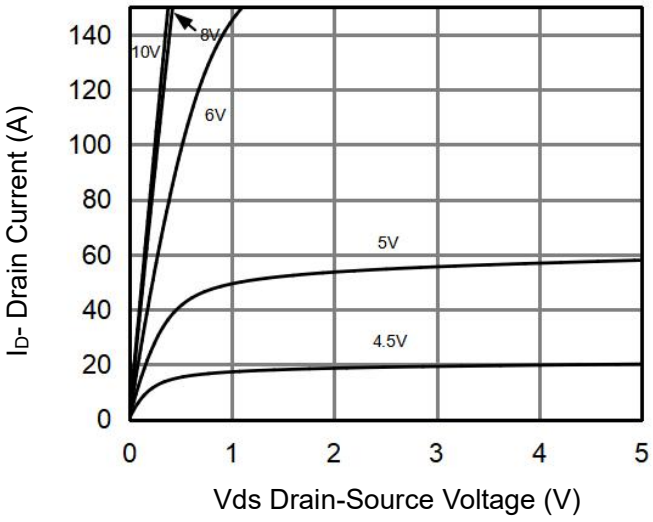


Figure 1 Output Characteristics

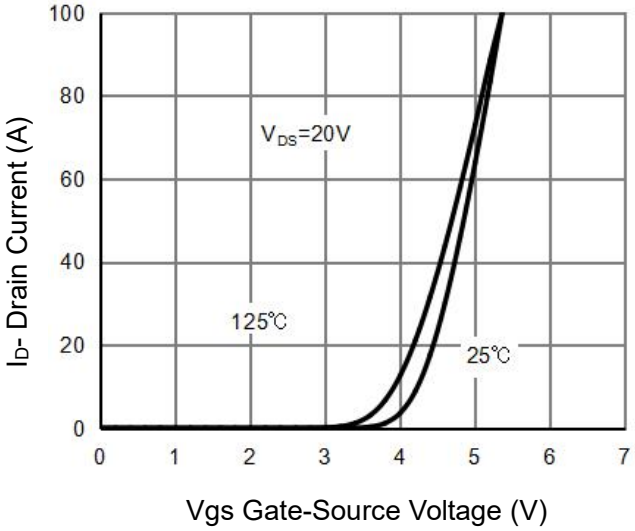


Figure 2 Transfer Characteristics

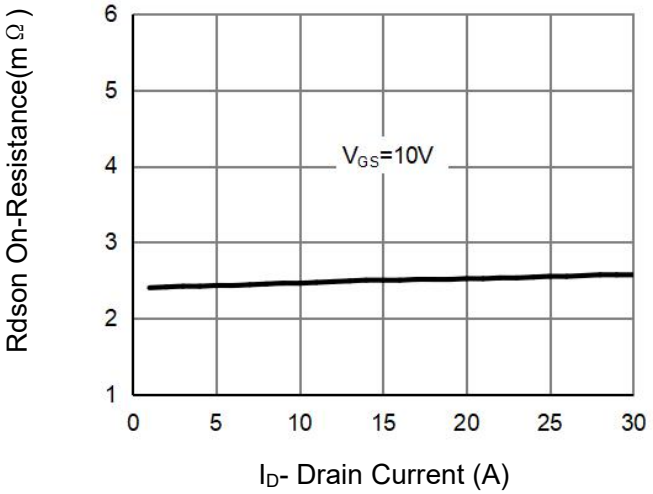


Figure 3 Rdson- Drain Current

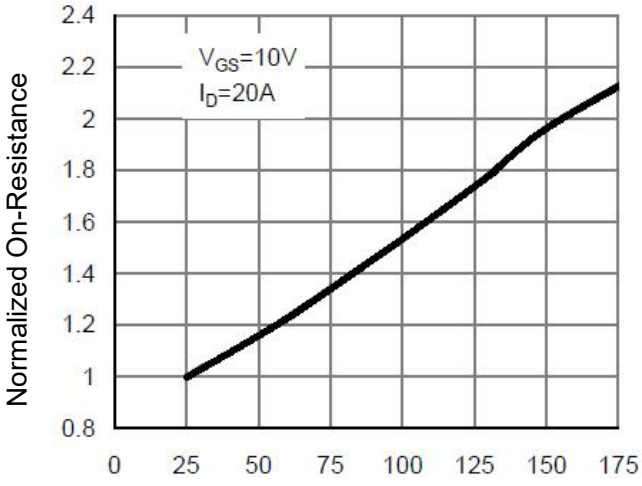


Figure 4 Rdson-Junction Temperature

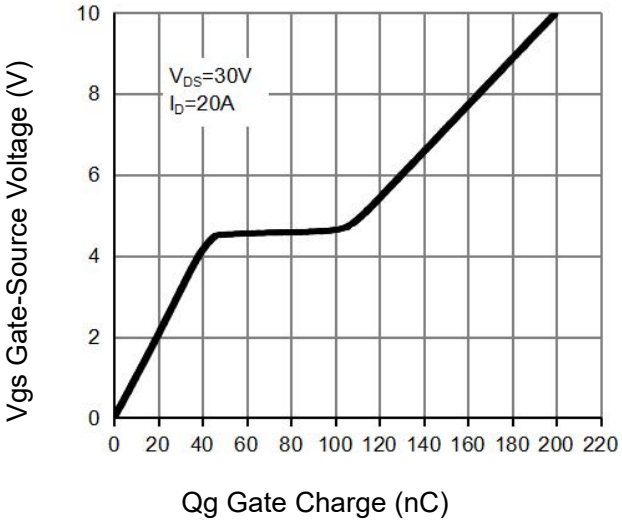


Figure 5 Gate Charge

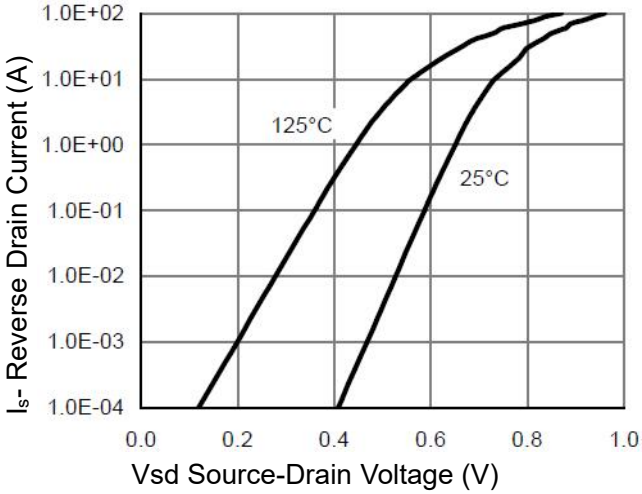


Figure 6 Source- Drain Diode Forward

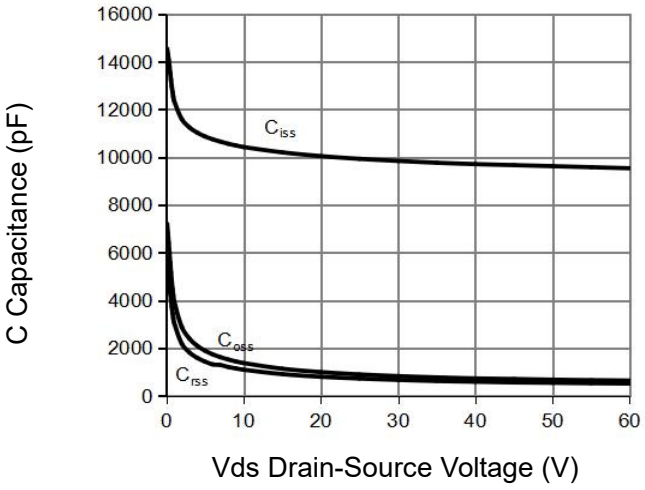


Figure 7 Capacitance vs Vds

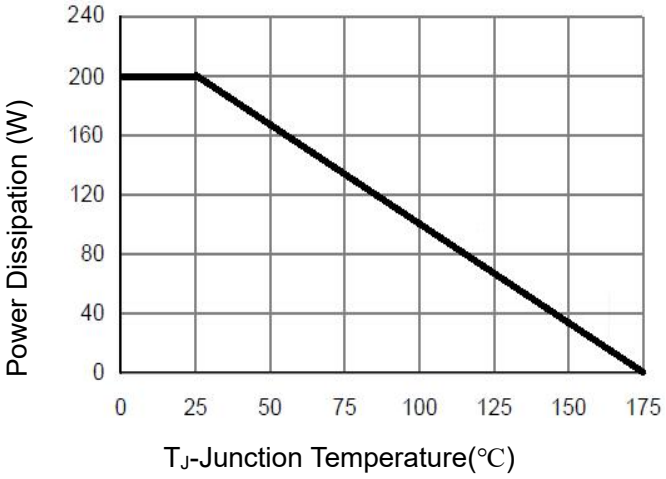


Figure 9 Power De-rating

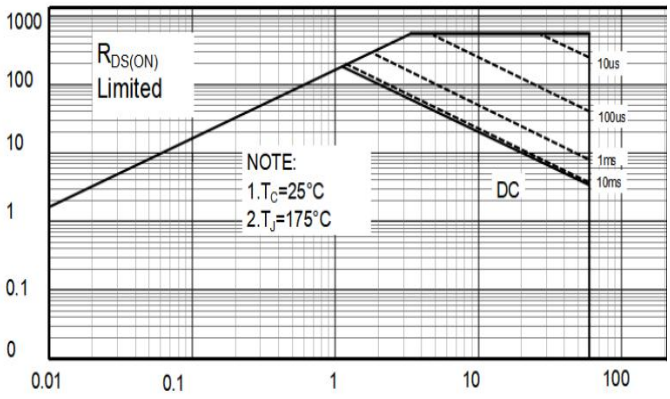


Figure 8 Safe Operation Area

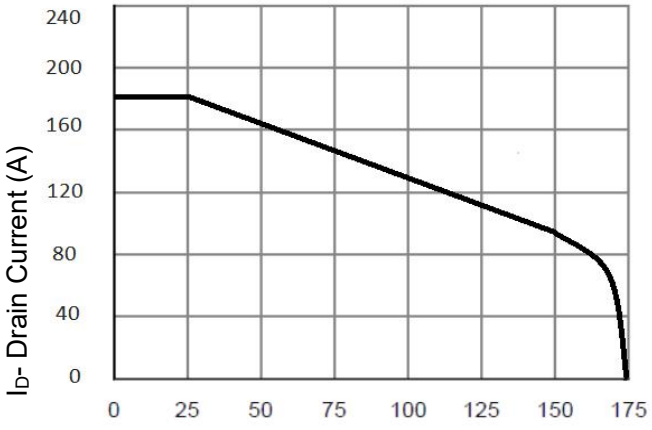


Figure 10 I_D Current De-rating

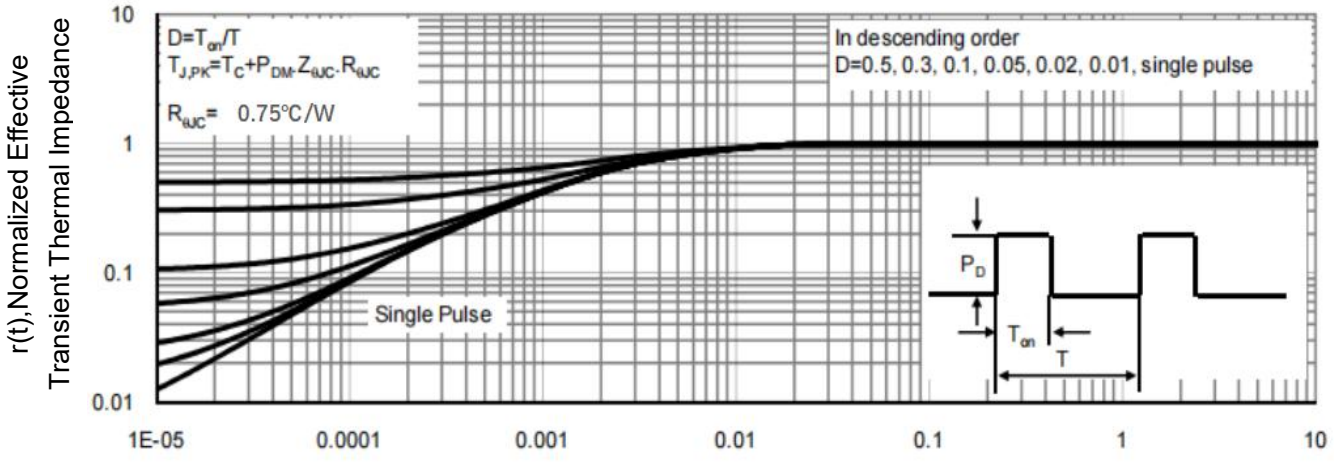
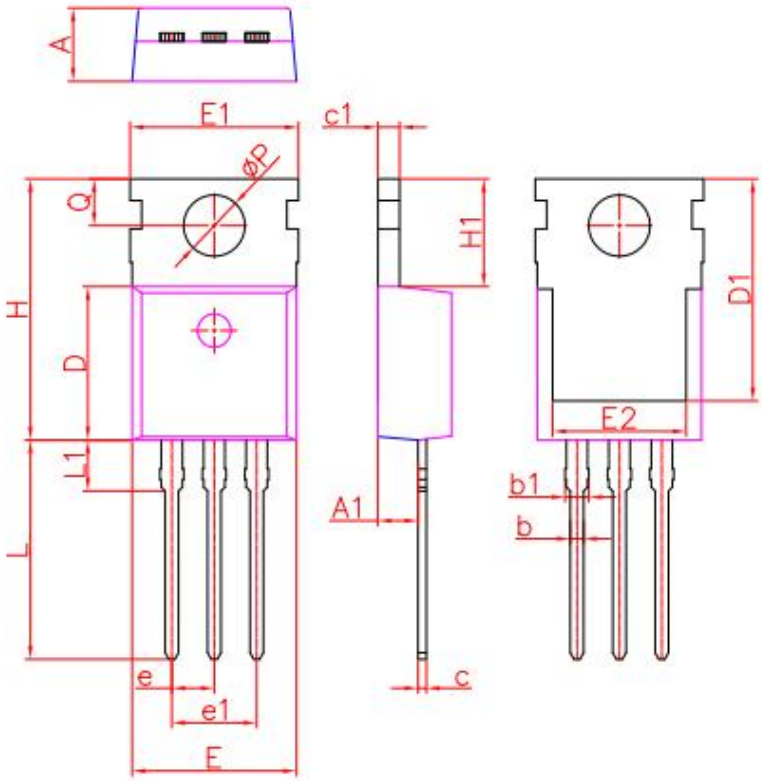


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220-3L Package Information



TO220			
DIM.	MIN.	NOM.	MAX.
A	4.20	4.40	4.60
A1	2.25	2.40	2.55
b	0.70	0.80	0.90
b1	1.17	1.27	1.37
c	0.33	0.50	0.65
c1	1.20	1.30	1.40
D	8.95	9.20	9.75
D1	13.10	13.30	13.50
E	9.74	9.84	10.04
E1	9.91	10.08	10.25
E2	7.90	8.00	8.10
e	2.54BSC		
e1	5.08BSC		
H	15.45	15.65	15.85
H1	6.30	6.45	6.60
L	12.90	13.13	13.40
L1	2.85	3.05	3.25
Q	2.65	2.80	2.95
øP	3.40	3.68	3.80
All dimensions in millimeters			

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