NCE N-Channel Enhancement Mode Power MOSFET

Description

The NCE40H14 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

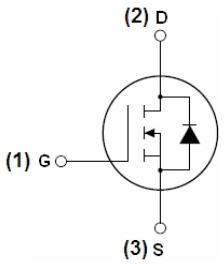
- V_{DS} =40V,I_D =140A
  $R_{DS(ON)}$ <2.9mΩ @ V_{GS}=10V
  $R_{DS(ON)}$ <5.8 mΩ @ V_{GS}=4.5V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

- Load switching
- Hard switched and high frequency circuits
- Uninterruptible power supply

100% UIS TESTED!

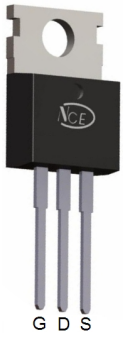
100% ΔVds TESTED!



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
NCE40H14	NCE40H14	TO-220-3L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	140	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	99	A
Pulsed Drain Current	I_{DM}	560	A
Maximum Power Dissipation	P_D	135	W
Derating factor		0.87	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	1180	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case(Note 2)	$R_{\theta JC}$	1.11	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

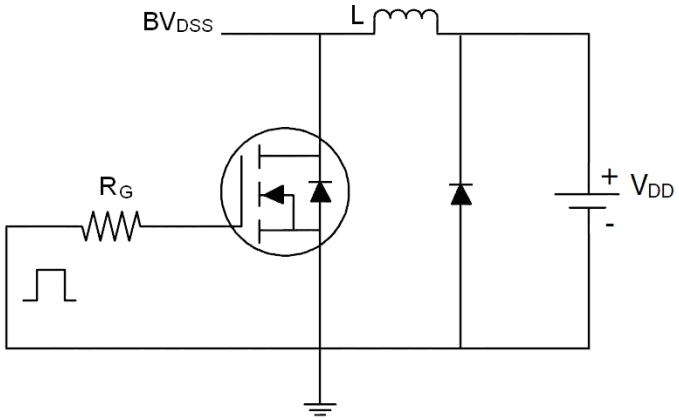
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=40V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1.2	1.9	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A	-	2.4	2.9	mΩ
		V_{GS}=4.5V, I_D=10A	-	3.65	5.8	
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=20A	-	30	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=20V,V_{GS}=0V, F=1.0MHz	-	4308	-	pF
Output Capacitance	C_{oss}		-	562	-	pF
Reverse Transfer Capacitance	C_{rss}		-	450	-	pF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=20V,I_D=2A,R_L=1Ω V_{GS}=10V,R_G=3Ω	-	14	-	nS
Turn-on Rise Time	t_r		-	16	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	48	-	nS
Turn-Off Fall Time	t_f		-	20	-	nS
Total Gate Charge	Q_g	V_{DS}=20V,I_D=20A, V_{GS}=10V	-	93.2	-	nC
Gate-Source Charge	Q_{gs}		-	15.6	-	nC
Gate-Drain Charge	Q_{gd}		-	20.6	-	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		-	-	140	A
Reverse Recovery Time	t_{rr}	TJ = 25°C, IF = 20A di/dt = 100A/μs(Note3)	-	42	-	nS
Reverse Recovery Charge	Qrr		-	45	-	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

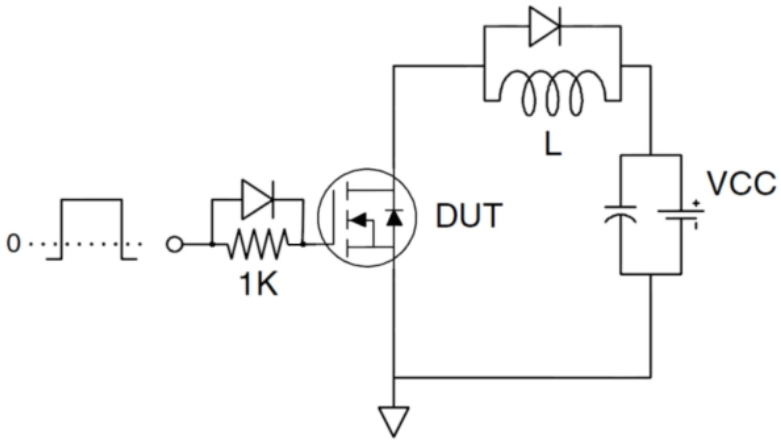
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. E_{AS} condition : Tj=25℃,V_{DD}=20V,V_G=10V,L=0.5mH,Rg=25Ω

Test circuit

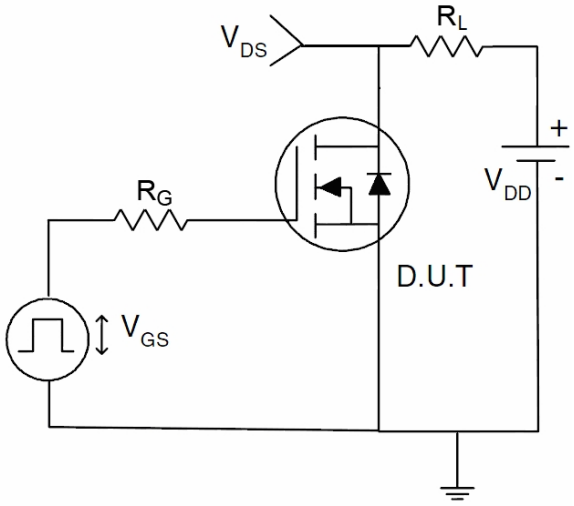
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

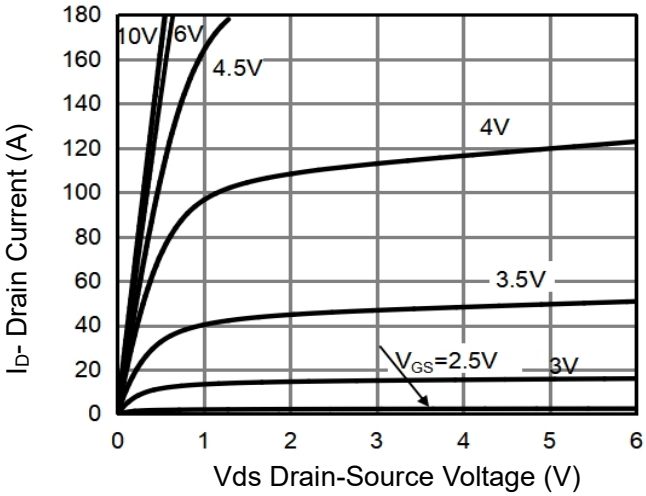


Figure 1 Output Characteristics

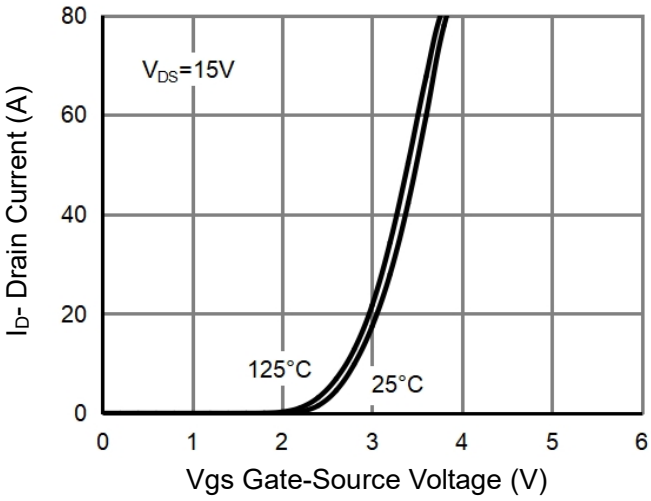


Figure 2 Transfer Characteristics

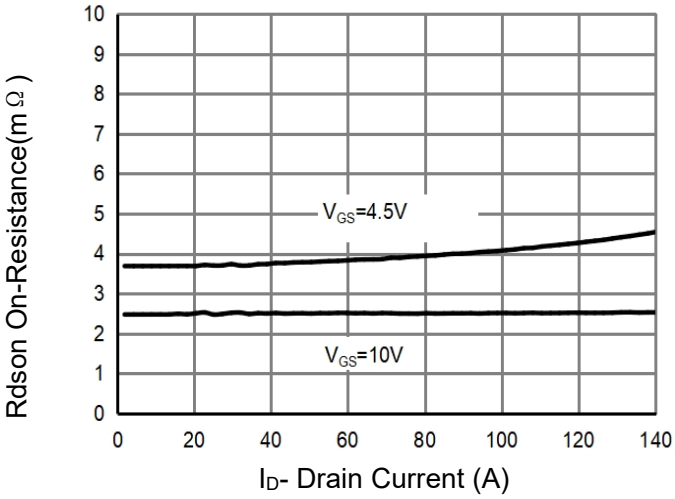


Figure 3 Rdson- Drain Current

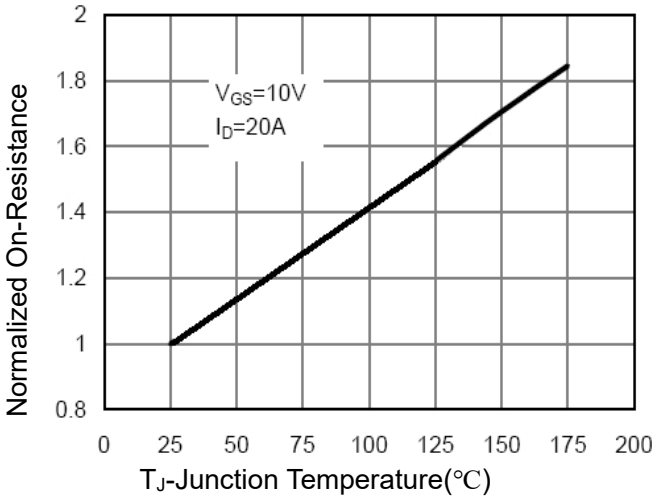


Figure 4 Rdson-JunctionTemperature

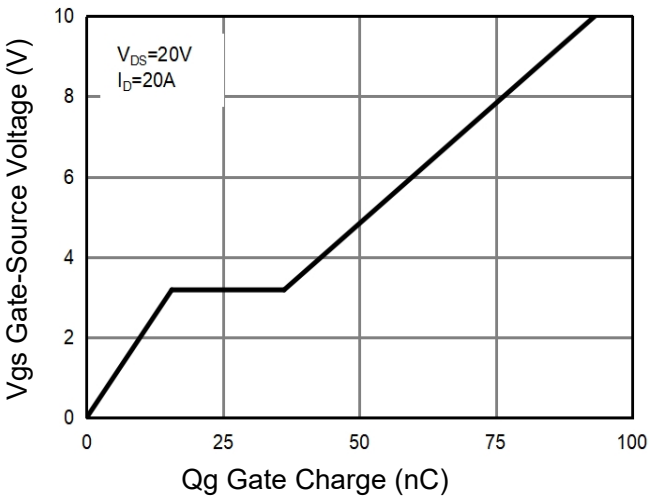


Figure 5 Gate Charge

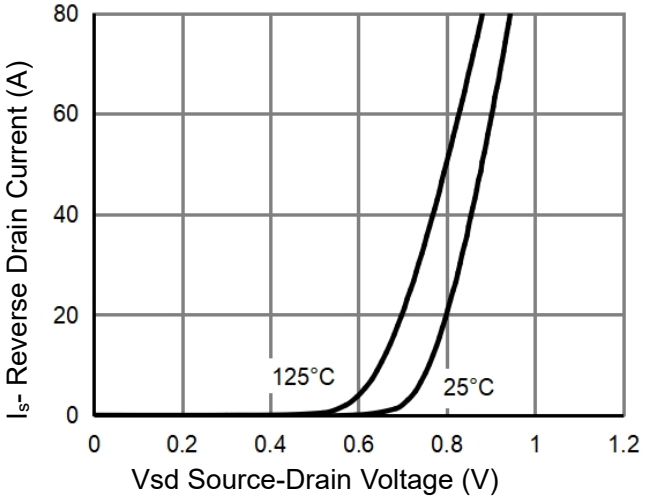


Figure 6 Source- Drain Diode Forward

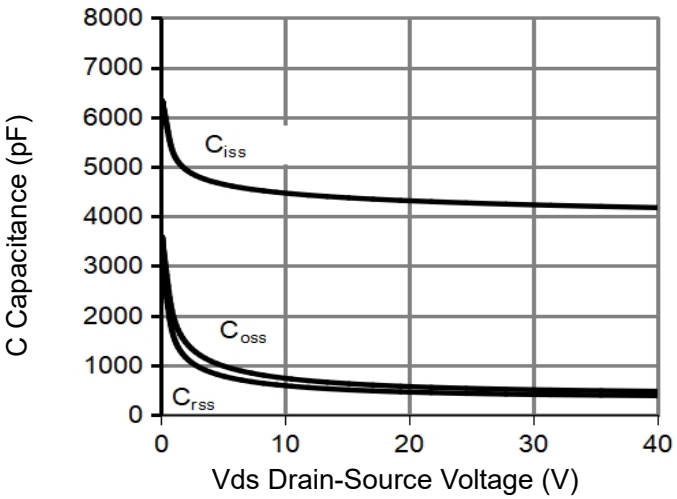


Figure 7 Capacitance vs Vds

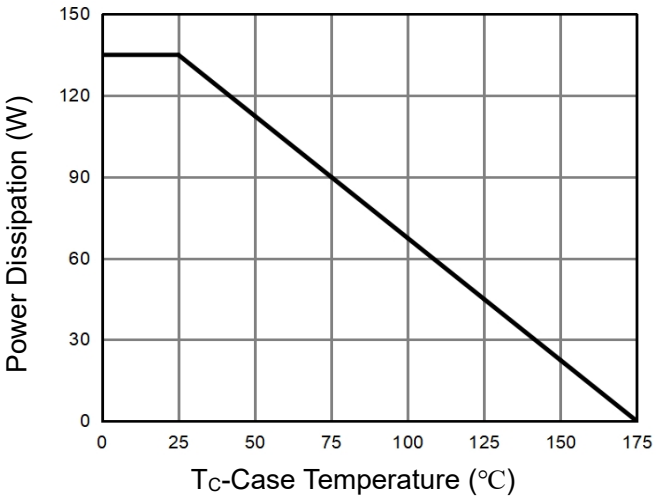


Figure 9 Power De-rating

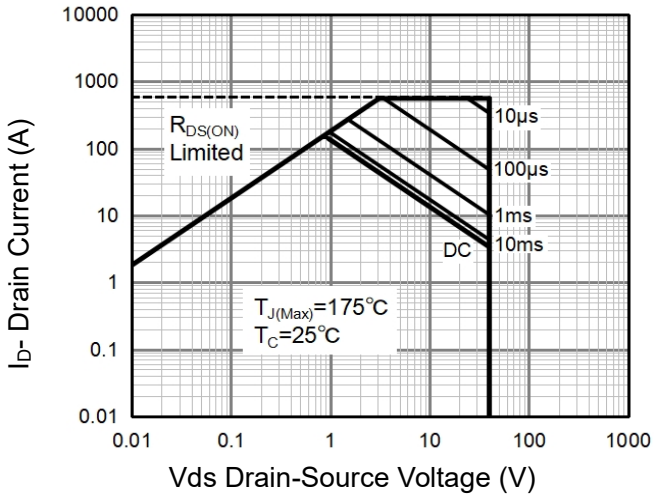


Figure 8 Safe Operation Area

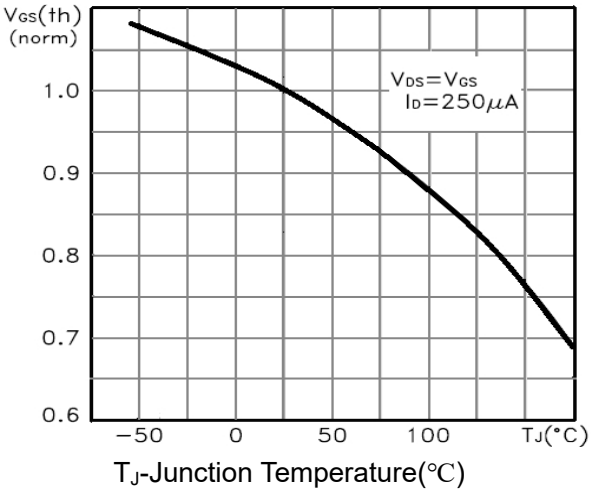


Figure 10 $V_{GS(th)}$ vs Junction Temperature

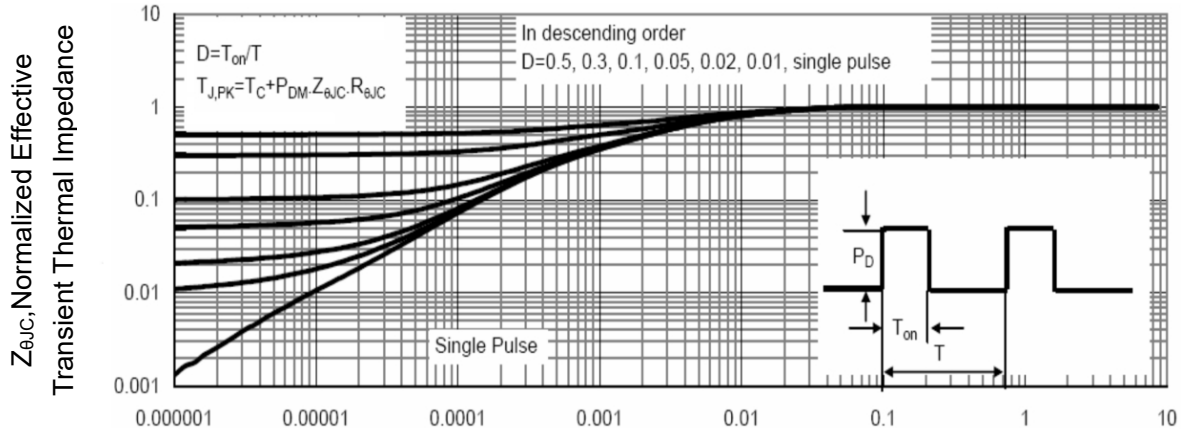
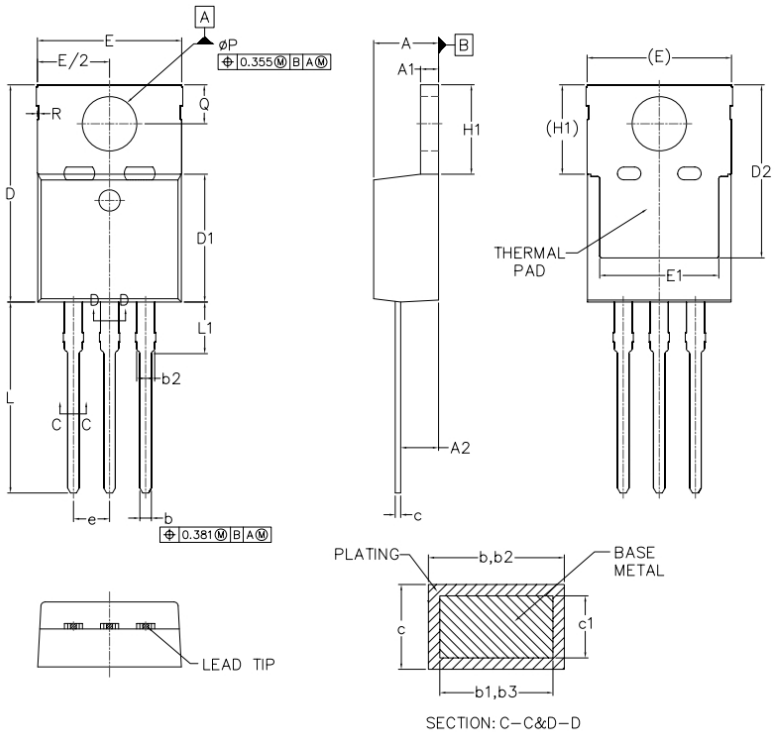


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220-3L Package Information



SYMBOLS	COMMON	
	MM	
	MIN.	MAX.
A	3.556	4.826
A1	0.508	1.397
A2	2.032	2.921
b	0.381	1.016
b1	0.381	0.965
b2	1.143	1.778
b3	1.143	1.727
c	0.356	0.610
c1	0.356	0.559
D	14.224	16.510
D1	8.382	9.017
D2	12.042	12.878
E	9.652	10.668
E1	6.858	8.890
e	2.540 BSC.	
H1	5.842	6.858
L	12.700	14.732
L1	3.560	4.060
øP	3.810	3.860
Q	2.540	3.048
R	0.127 BSC	

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