NCE N-Channel Enhancement Mode Power MOSFET

Description

The NCE60H28LL 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.

Application

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

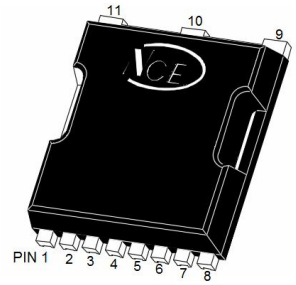
General Features

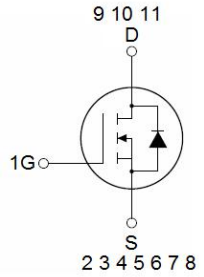
- V_{DS} =60V ,I_D =280A
  $R_{DS(ON)}$ < 2.2mΩ @ V_{GS}=10V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

100% UIS TESTED!

100% ΔVds TESTED!

TOLL





Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE60H28LL	NCE60H28LL	TO-LL	-	-	-

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	280	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	224	A
Pulsed Drain Current	I_{DM}	1120	A
Maximum Power Dissipation	P_D	296	W
Derating factor		1.97	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	2040	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case(Note 2)	$R_{\theta JC}$	0.51	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

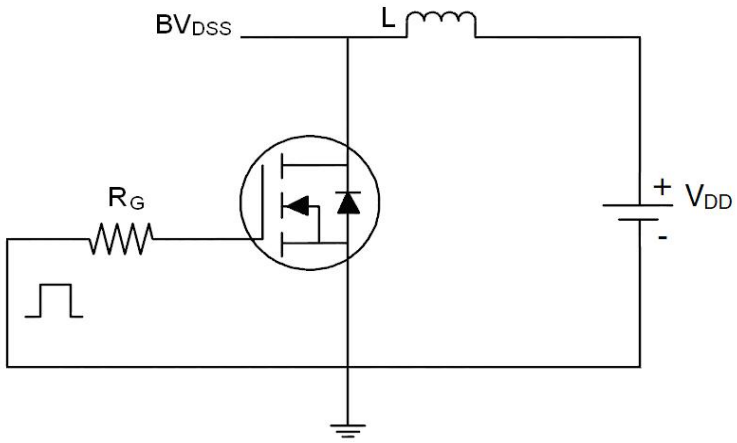
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 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	-	1.9	2.2	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=40A	-	70	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=30V,V_{GS}=0V, F=1.0MHz	-	10816	-	PF
Output Capacitance	C_{oss}		-	820	-	PF
Reverse Transfer Capacitance	C_{rss}		-	694	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V,I_D=2A,R_L=15Ω, R_G=2.5Ω,V_{GS}=10V	-	35	-	nS
Turn-on Rise Time	t_r		-	25	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	70	-	nS
Turn-Off Fall Time	t_f		-	13	-	nS
Total Gate Charge	Q_g	I_D=30A,V_{DD}=30V,V_{GS}=10V	-	197	-	nC
Gate-Source Charge	Q_{gs}		-	46	-	nC
Gate-Drain Charge	Q_{gd}		-	57	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=40A	-	0.8	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	280	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = 40A di/dt = 100A/μs(Note3)	-	31		nS
Reverse Recovery Charge	Qrr		-	80		nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

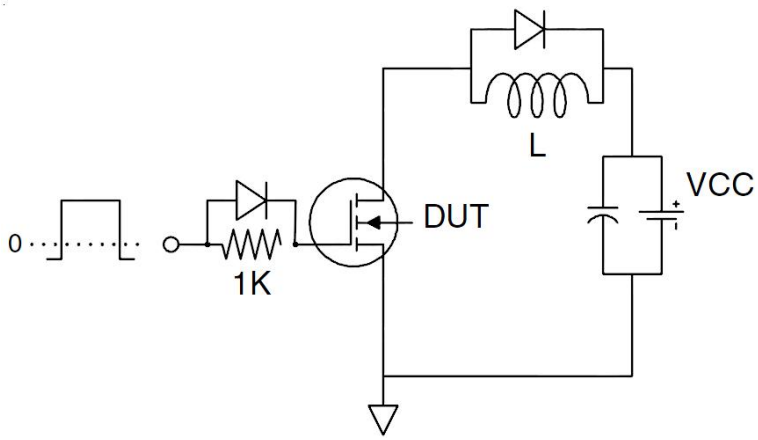
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition：Tj=25℃,V_{DD}=30V,V_G=10V,L=1mH,Rg=25Ω

Test circuit

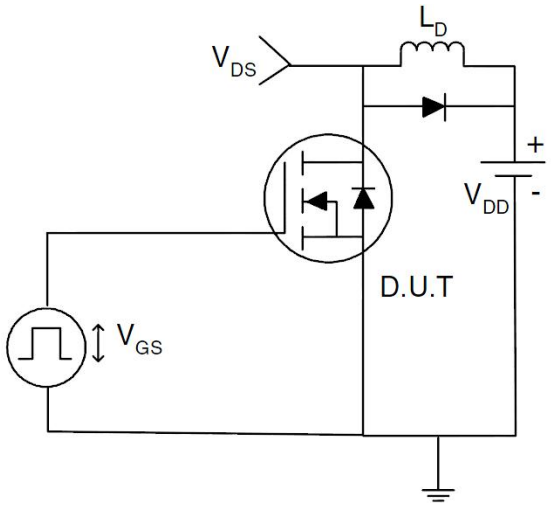
1）E_{AS} test Circuit



2）Gate charge test Circuit



3）Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

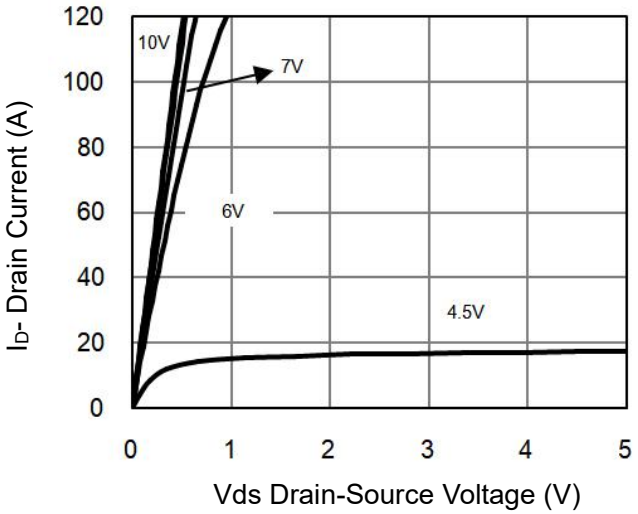


Figure 1 Output Characteristics

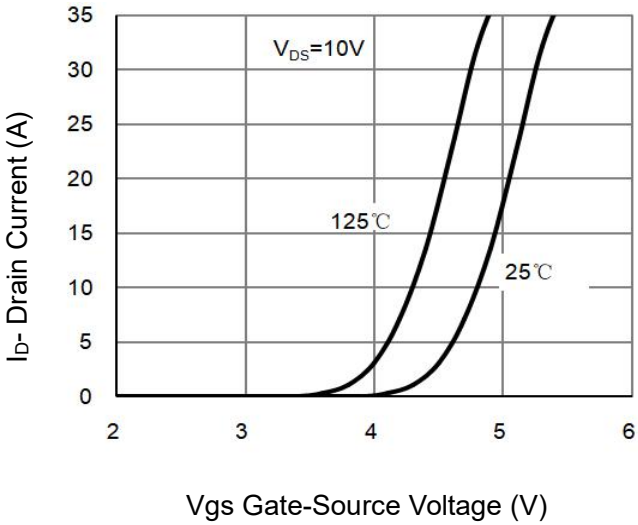


Figure 2 Transfer Characteristics

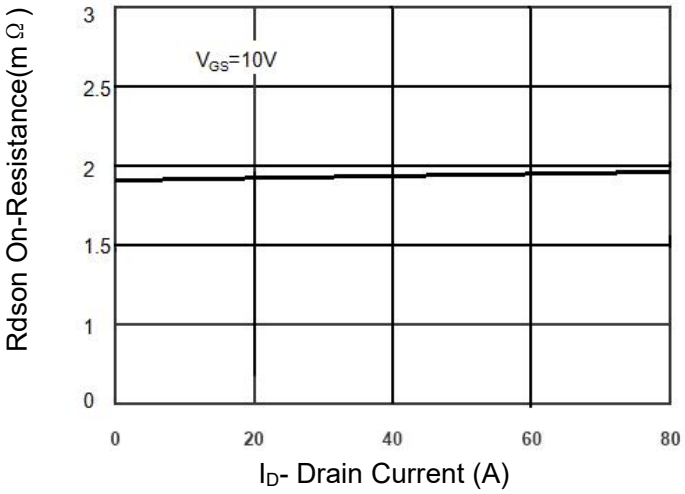


Figure 3 Rdson- Drain Current

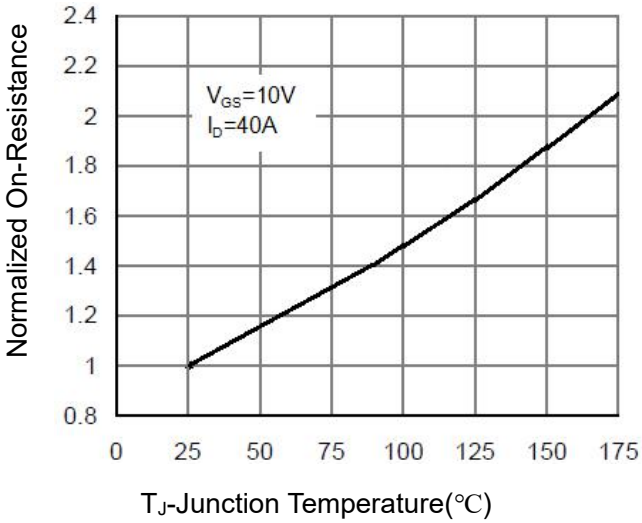


Figure 4 Rdson-JunctionTemperature

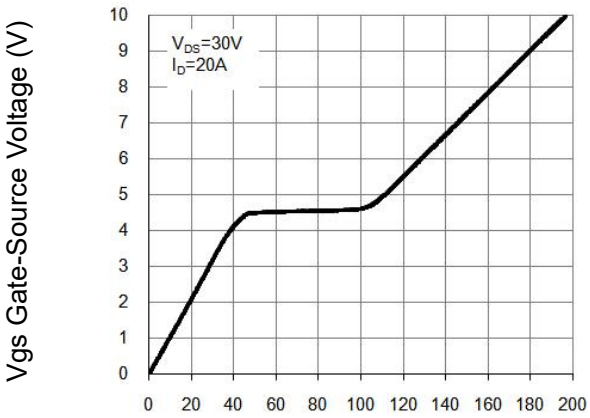


Figure 5 Gate Charge

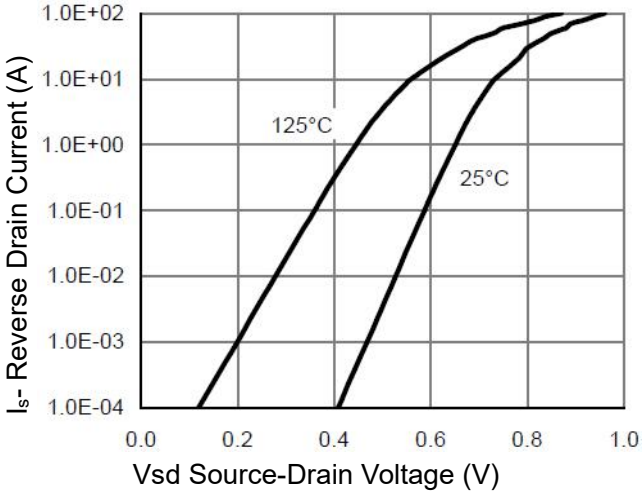


Figure 6 Source- Drain Diode Forward

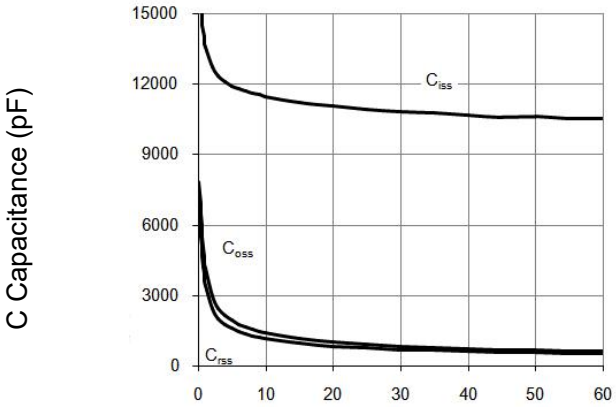


Figure 7 Capacitance vs Vds

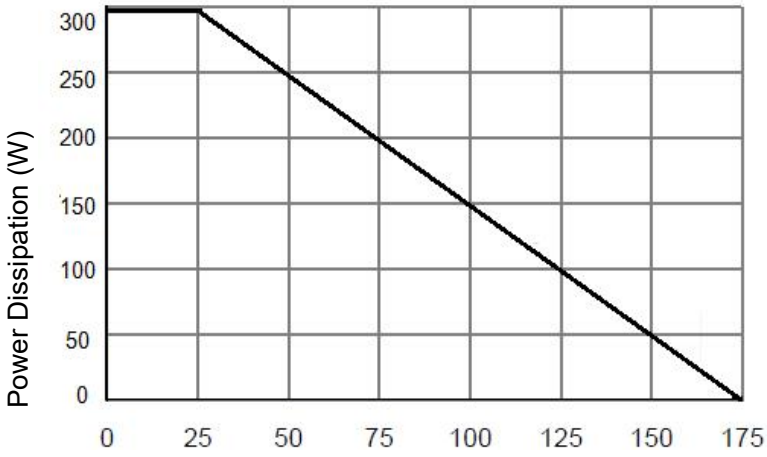


Figure 9 BV_{DSS} vs Junction Temperature

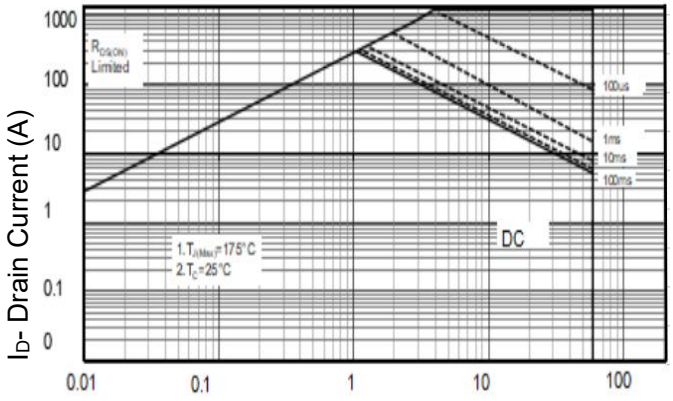


Figure 8 Safe Operation Area

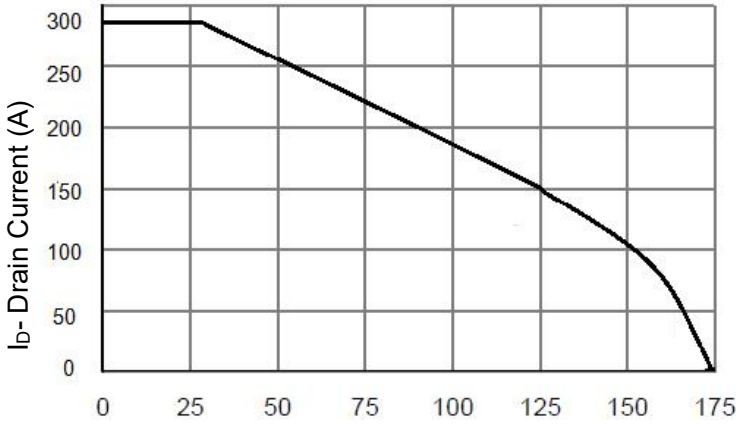


Figure 10 $V_{GS(th)}$ vs Junction Temperature

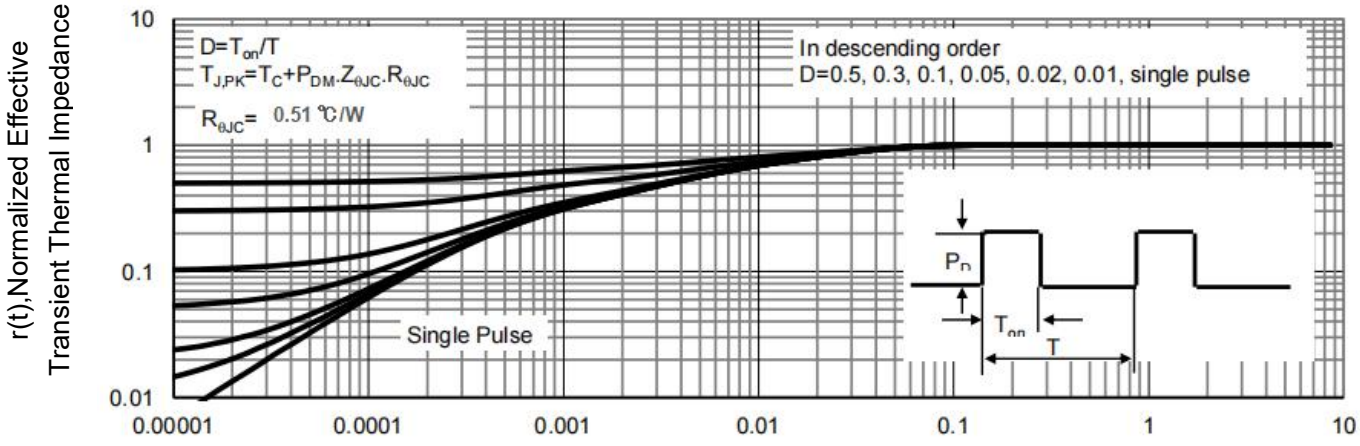
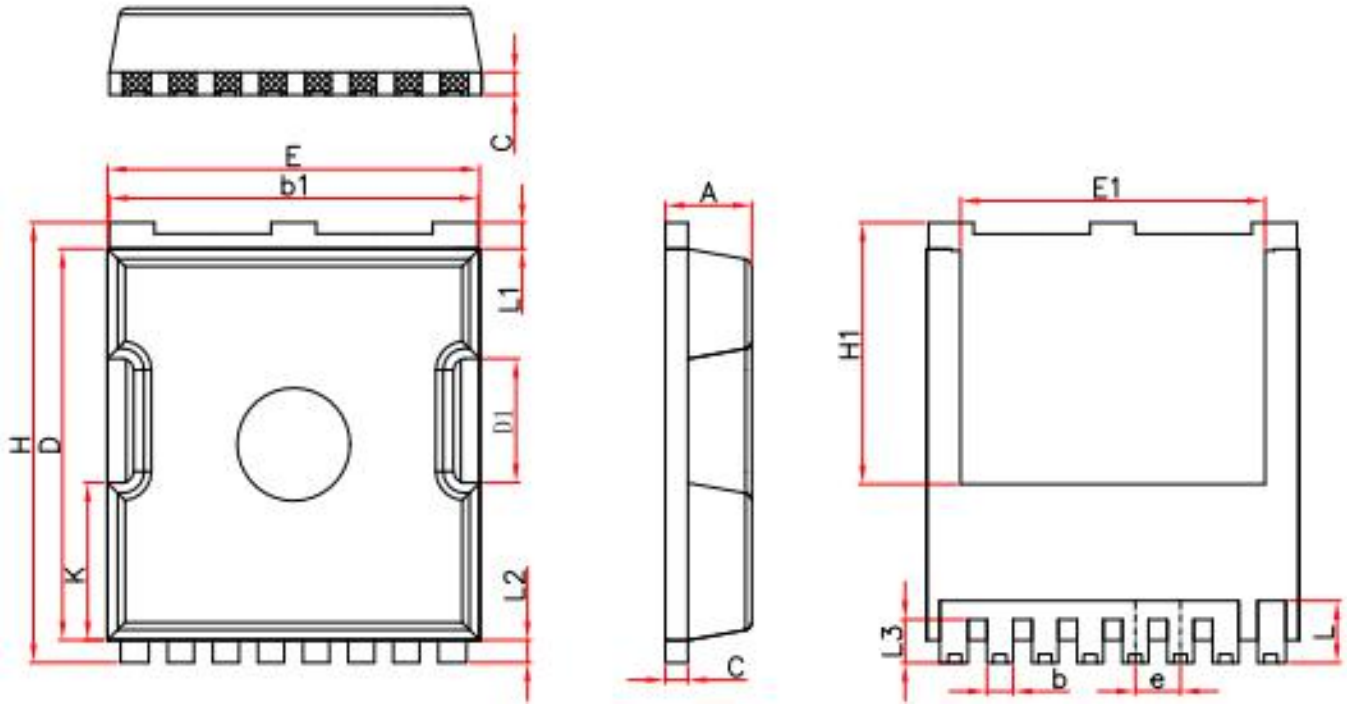


Figure 11 Normalized Maximum Transient Thermal Impedance

TOLL Package Information



Symbol	Millimeters		
	Min.	Nom.	Max.
A	2.20	2.30	2.40
b	0.65	0.75	0.85
b1	9.70	9.80	9.90
C	0.50	0.60	0.70
D	10.30	10.40	10.50
D1	3.15	3.3	3.45
E	9.70	9.90	10.10
E1	8.00	8.10	8.20
e	1.10	1.20	1.30
H	11.6	11.7	11.8
H1	6.85	6.95	7.05
K	4.08	4.18	4.28
L	1.60	1.65	2.10
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L3	1.05	1.20	1.30

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