NCE N-Channel Enhancement Mode Power MOSFET

Description

The NCE2030K 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} =20V, I_D =30A

  $R_{DS(ON)}$ <13mΩ @ V_{GS}=10V   (Typ:10.5mΩ)

- 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
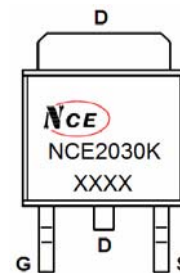- Special process technology for high ESD capability

Application

- Power switching application
- Load switching
- Uninterruptible power supply
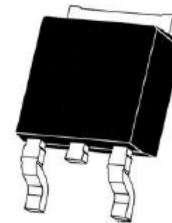
100% UIS TESTED!

100% ΔVds TESTED!
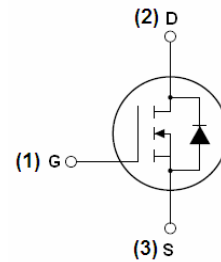
Schematic diagram

Marking and pin assignment

TO-252-2L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE2030K	NCE2030K	TO-252-2L	-	-	-

Absolute Maximum Ratings (T$_A$=25℃ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous	I_D	30	A
Drain Current-Continuous(T$_C$=100℃)	I_D (100℃)	21	A
Pulsed Drain Current	I_{DM}	75	A
Maximum Power Dissipation	P_D	40	W
Single pulse avalanche energy [Note 5]	E_{AS}	150	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case[Note 2]	$R_{\theta JC}$	3.8	℃/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	20	-	-	V
Zero Gate Voltage Drain Current	I$_{DSS}$	V$_{DS}$=20V,V$_{GS}$=0V	-	-	1	µA
Gate-Body Leakage Current	I$_{GSS}$	V$_{GS}$=±12V,V$_{DS}$=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V$_{GS(th)}$	V$_{DS}$=V$_{GS}$,I$_D$=250µA	0.5	0.7	1.2	V
Drain-Source On-State Resistance	R$_{DS(ON)}$	V$_{GS}$=4.5V, I$_D$=20A	-	10.5	13	mΩ
Forward Transconductance	g$_{FS}$	V$_{DS}$=5V,I$_D$=20A	10	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C$_{Iss}$	V$_{DS}$=10V,V$_{GS}$=0V, F=1.0MHz		900		PF
Output Capacitance	C$_{oss}$			162		PF
Reverse Transfer Capacitance	C$_{rss}$			105		PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t$_{d(on)}$	VGS=10V,VDS=10V RL=0. 5Ω,RGEN=3Ω	-	4.5	-	nS
Turn-on Rise Time	t$_r$		-	9.2	-	nS
Turn-Off Delay Time	t$_{d(off)}$		-	18.7	-	nS
Turn-Off Fall Time	t$_f$		-	3.3	-	nS
Total Gate Charge	Q$_g$	VGS=10V,VDS=10V,ID=20A		15		nC
Gate-Source Charge	Q$_{gs}$			1.8		nC
Gate-Drain Charge	Q$_{gd}$			2.8		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$_S$	-	-	-	30	A
Reverse Recovery Time	t$_{rr}$	TJ = 25°C, IF = 20A di/dt = 100A/µs (Note3)	-	18	-	nS
Reverse Recovery Charge	Qrr		-	9.5	-	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

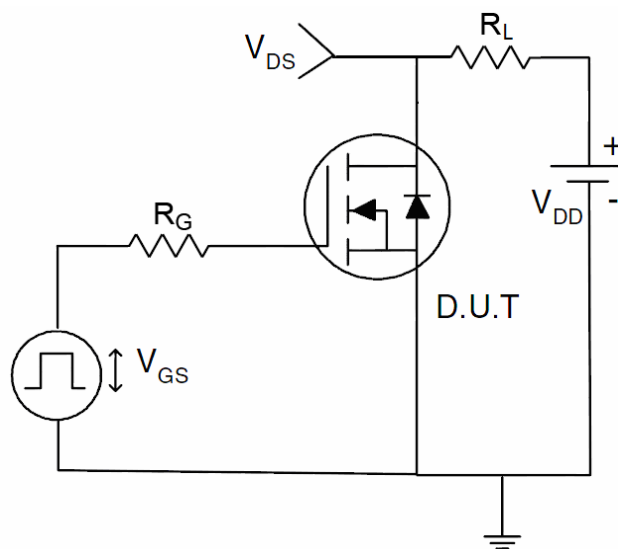**5.** EAS condition：Tj=25℃,V$_{DD}$=10V,V$_G$=10V,L=0.5mH,Rg=25Ω

Test circuit

1）E$_{AS}$ test Circuits

2）Gate charge test Circuit:

3）Switch Time Test Circuit：

Typical Electrical and Thermal Characteristics (Curves)

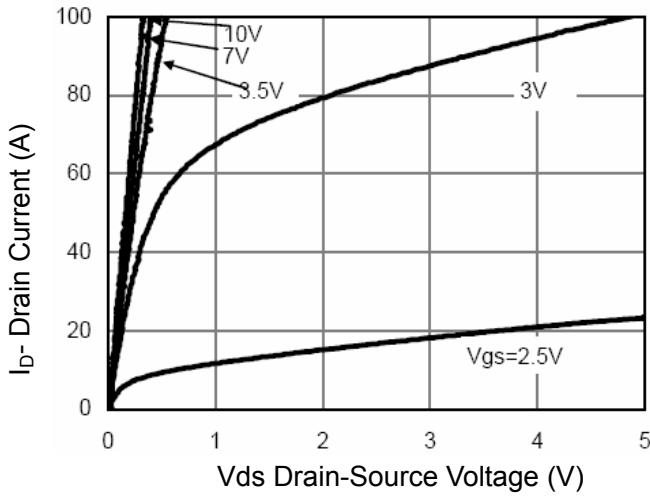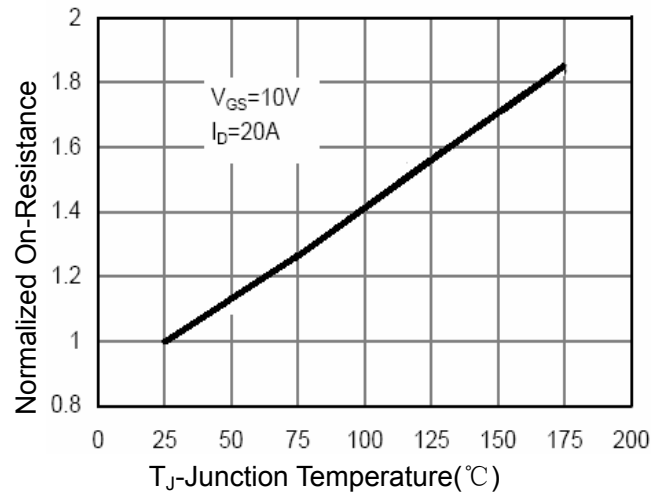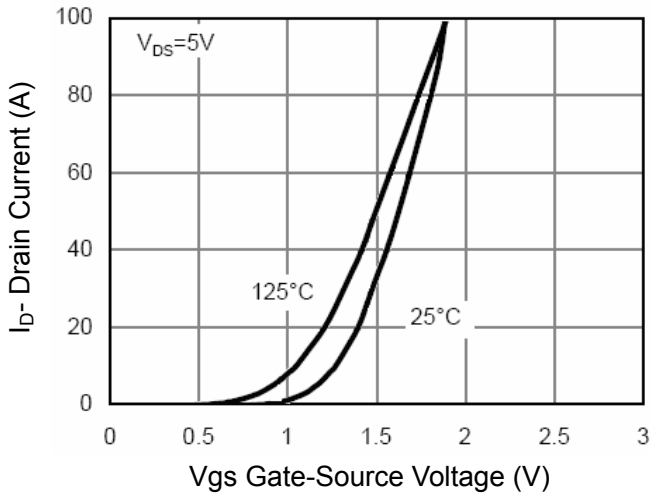**Figure 1 Output Characteristics**

Figure 2 Transfer Characteristics
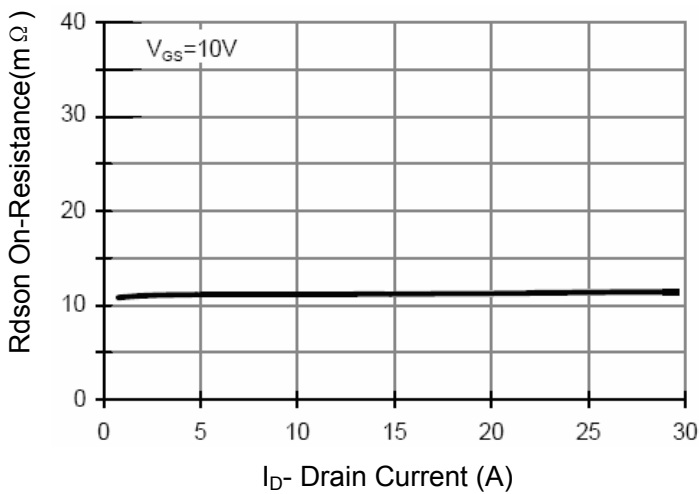
Figure 3 Rdson- Drain Current

Figure 4 Rdson-Junction Temperature

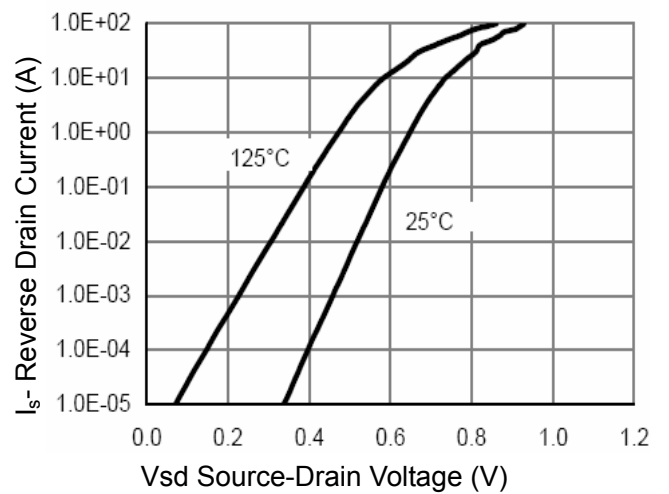**Figure 5 Gate Charge**

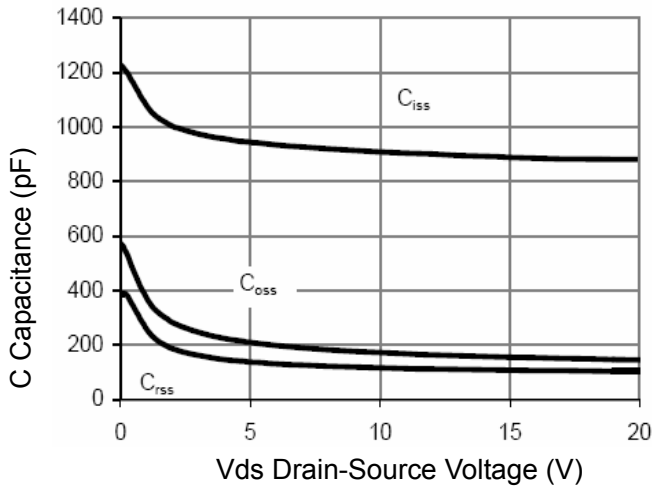**Figure 6 Source- Drain Diode Forward**
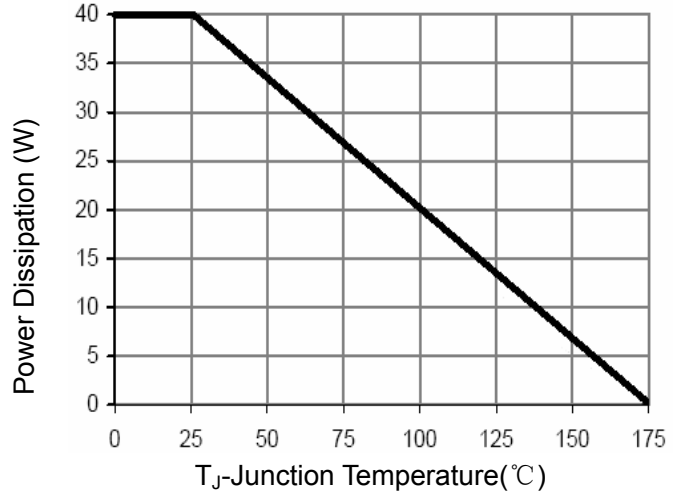
Figure 7 Capacitance vs Vds

Figure 9 Power De-rating
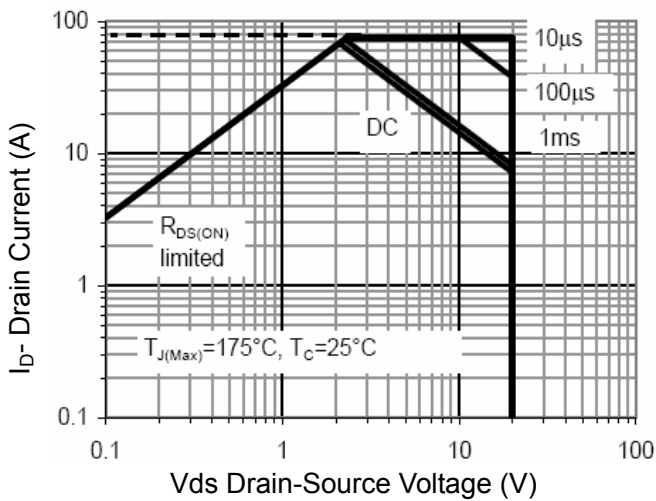
Figure 8 Safe Operation Area

Figure 10 Current De-rating

$D=T_{on}/T$

$T_{J,PK}=T_A+P_{DM}\cdot Z_{\theta JA}\cdot R_{\theta JA}$

$R_{\theta JA}=3.8°C/W$

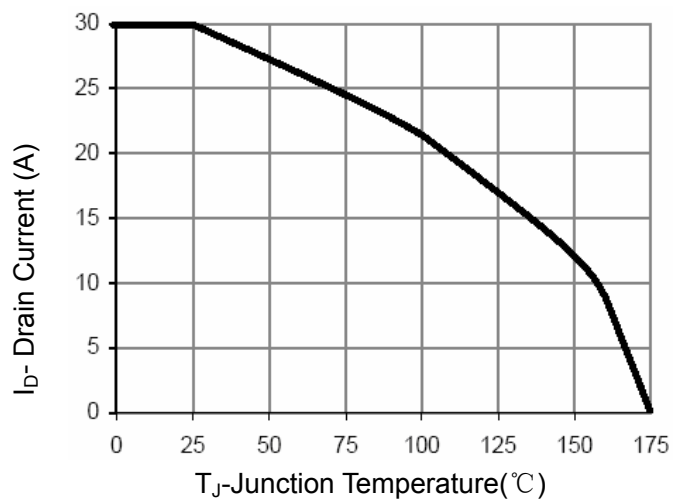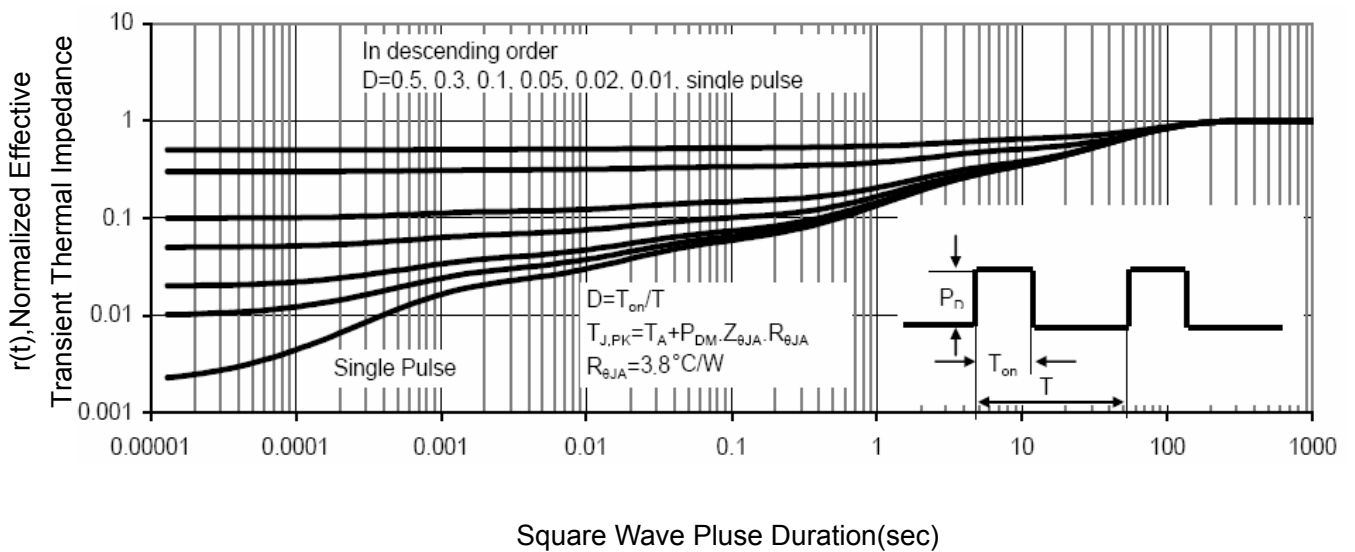Square Wave Pluse Duration(sec)

Figure 11 Normalized Maximum Transient Thermal Impedance

TO-252 Package Information

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	**Max.**	**Min.**	**Max.**
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	

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