

NCE N-Channel Enhancement Mode Power MOSFET

General Description

The NCE7559k 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.

Features

- $V_{DS}=75V$; $I_D=59A@V_{GS}=10V$;
 $R_{DS(ON)}<8.5m\Omega @V_{GS}=10V$
- Special process technology for high ESD capability
- Special designed for Convertors and power controls
- High density cell design for ultra low R_{dson}
- Fully characterized Avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

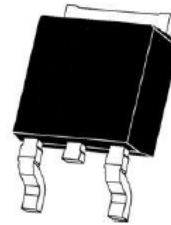
Application

- Power switching application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply

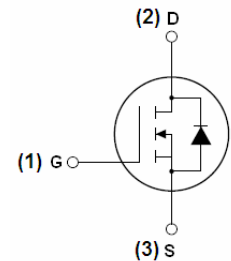
Product Summary

BV_{DSS}	typ.	84	V
$R_{DS(ON)}$	typ.	7.2	m Ω
	max.	8.5	m Ω
I_D		59	A

100% UIS TESTED!



TO-252-2L top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE7559K	NCE7559K	TO-252-2L	-	-	-

Table 1. Absolute Maximum Ratings ($T_C=25^\circ C$)

Parameter	Symbol	Value	Unit
Drain-Source Voltage ($V_{GS}=0V$)	V_{DS}	75	V
Gate-Source Voltage ($V_{DS}=0V$)	V_{GS}	± 20	V
Drain Current (DC) at $T_C=25^\circ C$	$I_{D(DC)}$	59	A
Drain Current (DC) at $T_C=100^\circ C$	$I_{D(DC)}$	41	A
Drain Current-Continuous@ Current-Pulsed (Note 1)	$I_{DM(pluse)}$	230	A
Maximum Power Dissipation($T_C=25^\circ C$)	P_D	130	W
Derating factor		0.87	W/ $^\circ C$
Single pulse avalanche energy (Note 2)	E_{AS}	550	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature

2.EAS condition : $T_J=25^\circ C, V_{DD}=37.5V, V_G=10V, L=0.5mH$

Table 2. Thermal Characteristic

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case (Maximum)	R_{thJC}	1.15	$^{\circ}C/W$
Thermal Resistance, Junction-to-Ambient (Maximum)	R_{thJA}	63	$^{\circ}C/W$

Table 3. Electrical Characteristics ($T_C=25^{\circ}C$ unless otherwise noted)

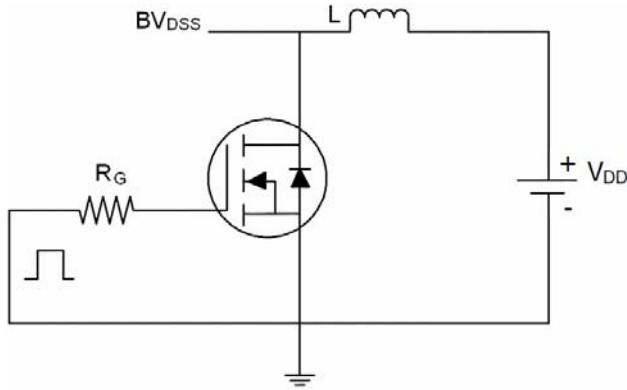
Parameter	Symbol	Condition	Min	Typ	Max	Unit
On/off states						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	75	84	-	V
Zero Gate Voltage Drain Current($T_C=25^{\circ}C$)	I_{DSS}	$V_{DS}=75V, V_{GS}=0V$	-	-	1	μA
Zero Gate Voltage Drain Current($T_C=125^{\circ}C$)	I_{DSS}	$V_{DS}=75V, V_{GS}=0V$	-	-	10	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	2.85	4	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=30A$	-	7.2	8.5	m Ω
Dynamic Characteristics						
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=30A$	-	60	-	S
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V,$ $F=1.0MHz$	-	3400	-	PF
Output Capacitance	C_{oss}		-	290	-	PF
Reverse Transfer Capacitance	C_{rss}		-	221	-	PF
Total Gate Charge	Q_g	$V_{DS}=30V, I_D=30A,$ $V_{GS}=10V$	-	94	-	nC
Gate-Source Charge	Q_{gs}		-	16	-	nC
Gate-Drain Charge	Q_{gd}		-	24	-	nC
Switching times						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, I_D=2A, R_L=15\Omega$ $V_{GS}=10V, R_G=2.5\Omega$	-	15	-	nS
Turn-on Rise Time	t_r		-	11	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	52	-	nS
Turn-Off Fall Time	t_f		-	13	-	nS
Source- Drain Diode Characteristics						
Source-drain current(Body Diode)	I_{SD}		-	-	59	A
Forward on voltage ^(Note 1)	V_{SD}	$T_j=25^{\circ}C, I_{SD}=40A, V_{GS}=0V$	-	-	1.2	V
Reverse Recovery Time ^(Note 1)	t_{rr}	$T_j=25^{\circ}C, I_F=40A, di/dt=100A/\mu s$	-	-	33	nS
Reverse Recovery Charge ^(Note 1)	Q_{rr}		-	-	54	nC
Forward Turn-on Time	t_{on}	Intrinsic turn-on time is negligible(turn-on is dominated by L_S+L_D)				

Notes

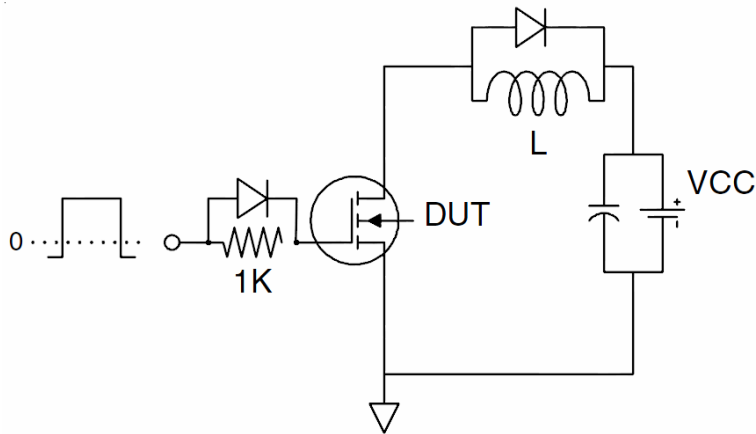
1. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 1.5\%$, $R_G=25\Omega$, Starting $T_j=25^{\circ}C$

Test circuit

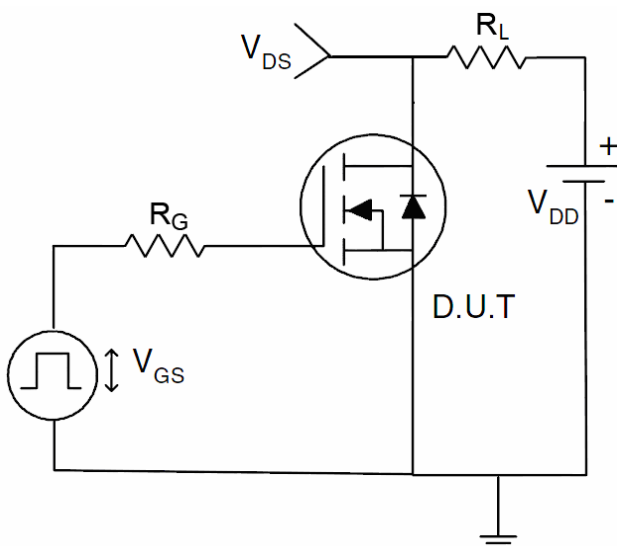
1) E_{AS} test circuit



2) Gate charge test circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (curves)

Figure1. Safe operating area

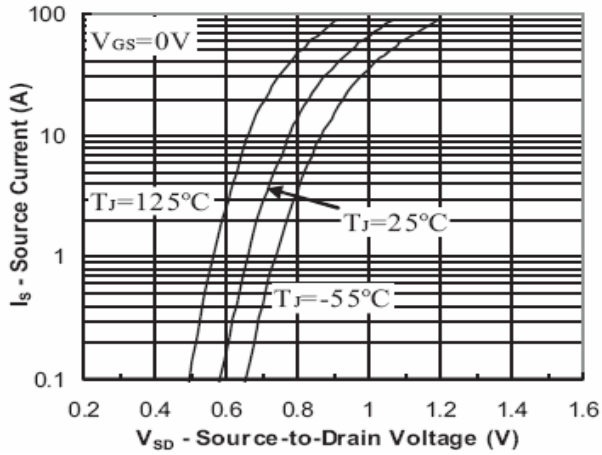


Figure2. Source-Drain Diode Forward Voltage

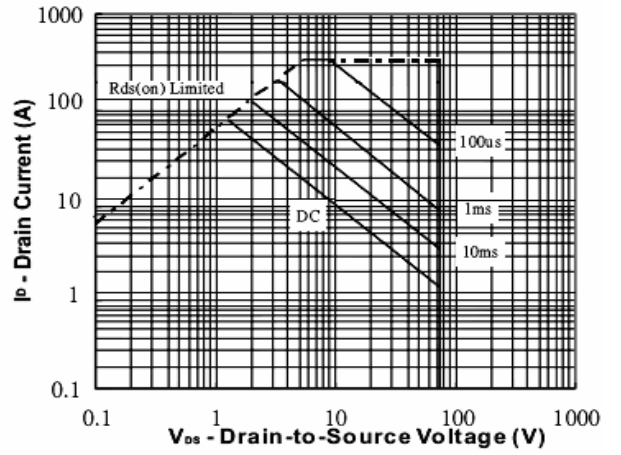


Figure3. Output characteristics

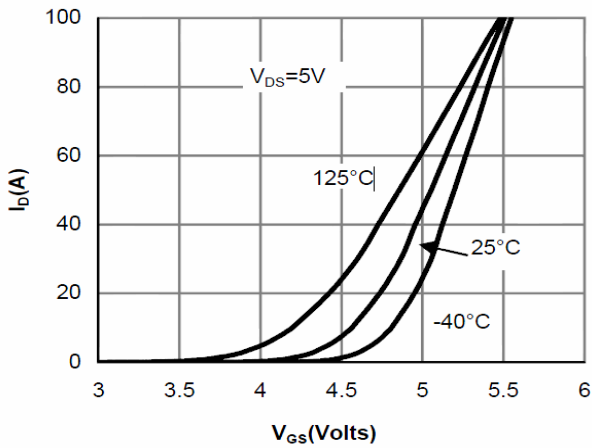


Figure4. Transfer characteristics

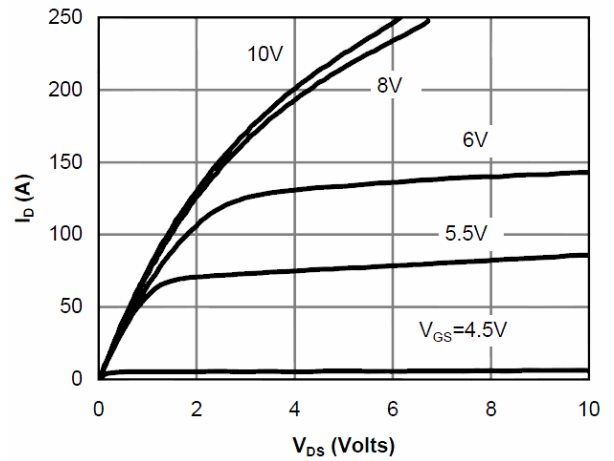


Figure5. Static drain-source on resistance

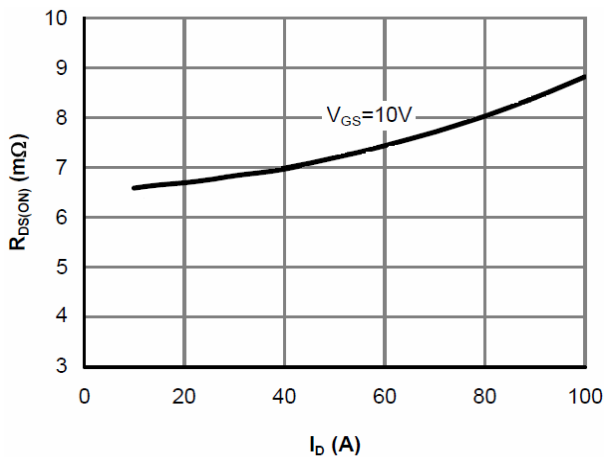


Figure6. RDS(ON) vs Junction Temperature

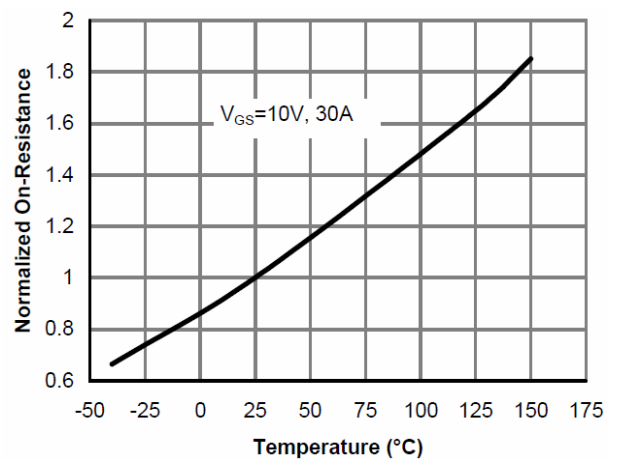


Figure7. BV_{DSS} vs Junction Temperature

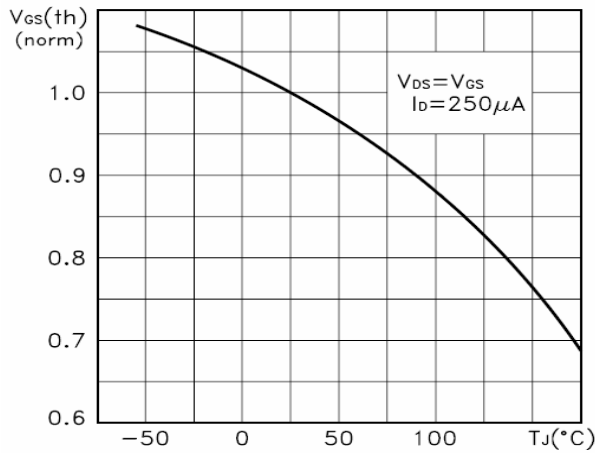


Figure8. $V_{GS(th)}$ vs Junction Temperature

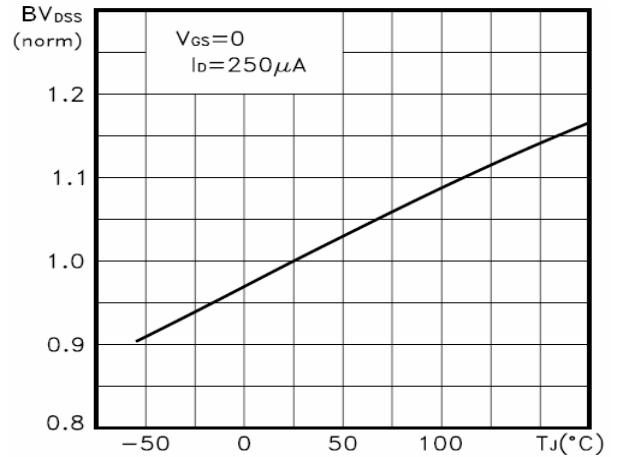


Figure9. Capacitance

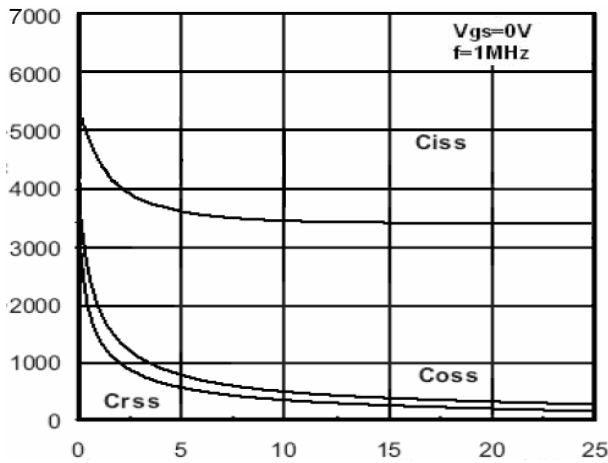


Figure10. Gate charge waveforms

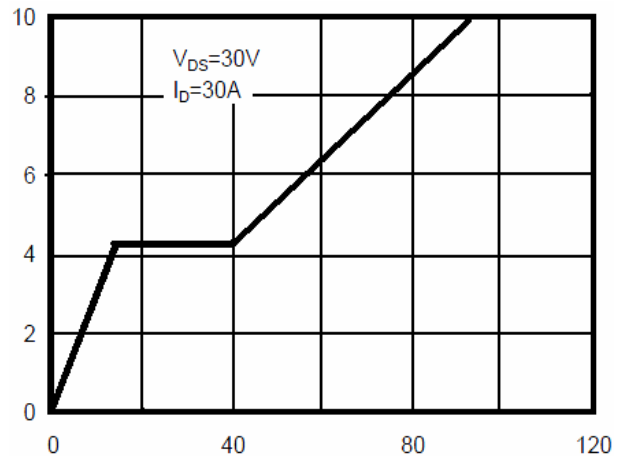
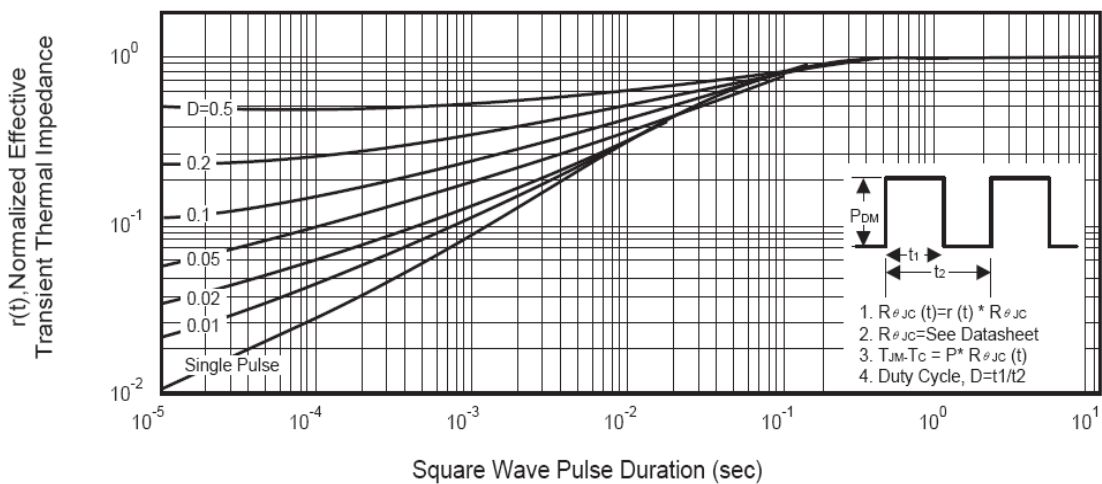
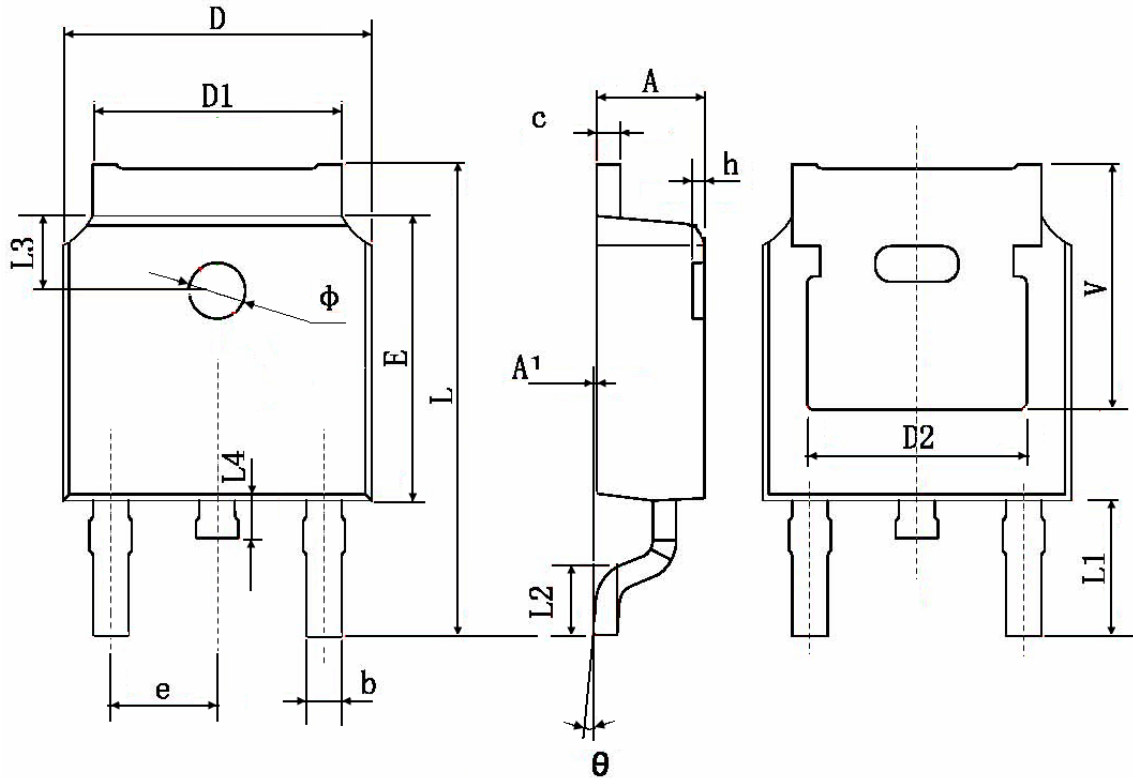


Figure11. Normalized Maximum Transient Thermal Impedance



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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