



### NCE N-Channel Enhancement Mode Power MOSFET



The NCE5549 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**

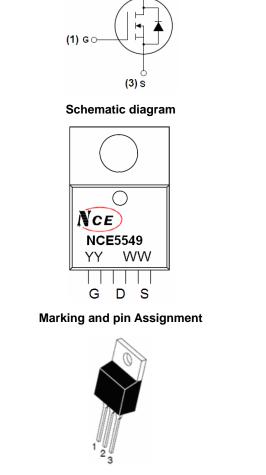
- $V_{DS} = 55V, I_D = 49A$  $R_{DS(ON)} < 15m\Omega @ V_{GS} = 10V$  (Typ:8.4m $\Omega$ )
- High density cell design for ultra low Rdson
- Fully characterized Avalanche voltage and current
- Good stability and uniformity with high E<sub>AS</sub>
- Excellent package for good heat dissipation
- Special 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!



(2) D

TO-220 top view

#### Package Marking And Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE5549	NCE5549	TO-220	-	-	-

#### Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	Vds	55	V
Gate-Source Voltage	Vgs	±20	V
Drain Current-Continuous	I <sub>D</sub>	49	А
Drain Current-Continuous(T <sub>C</sub> =100℃)	I <sub>D</sub> (100℃)	35	Α
Pulsed Drain Current	I <sub>DM</sub>	160	А
Maximum Power Dissipation	PD	100	W
Derating factor		0.67	W/℃
Single pulse avalanche energy (Note 5)	E <sub>AS</sub>	450	mJ
Operating Junction and Storage Temperature Range	TJ,TSTG	-55 To 175	°C





#### **Thermal Characteristic**

Thermal Resistance, Junction-to-Case(Note 2)	R <sub>θJC</sub>	1.5	°C/W
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#### Electrical Characteristics (TA=25°C unless otherwise noted)

Zero Gate Voltage Drain CurrentIosJosVosVosIIµGate-Body Leakage CurrentIgss $V_{Ds}$ =55V, V_{Gs}=0Vii1µGate-Body Leakage CurrentIgss $V_{Os}$ =220V, V_{Ds}=0Vii100nOn Characteristics (Note 3)Gate Threshold Voltage $V_{Gs}(m)$ $V_{Os}$ =250µA24VGate Threshold Voltage $V_{Gs}(m)$ $V_{Os}$ =10V, Ip=25A8.415mForward Transconductance $g_{FS}$ $V_{Ds}$ =25V, Ip=25A2025Dynamic Characteristics (Note4)Input Capacitance $C_{Iss}$ $V_{Ds}$ =25V, V_{Gs}=0V, Ip=25A350PReverse Transfer Capacitance $C_{rss}$ $F=1.0MHz$ 85PPSwitching Characteristics (Note 4)Turn-on Delay Time $t_{d(on)}$ $V_{Gs}$ =10V, R_{GEN}4.5Q40nTurn-On Dialy Time $t_{d(on)}$ $V_{Gs}$ =10V, R_{GEN}4.5Q40nnTurn-Off Delay Time $t_{d(off)}$ $V_{Gs}$ =10V, R_{GEN}4.5Q42nGate-Source Charge $Q_{gg}$ $V_{Gs}$ =0V, Is=25A, V_{GS}=10V9nGate-Source Diode Characteristics $V_{SD}$ $V_{GS}$ =0V, Is=25A0.851.2NDiode Forward Voltage (Note 3) $V_{SD}$ $V_{GS}$ =0V, Is=25A62100nReverse Recovery Time $t_{rr}$ $TJ$ = 25°C, IF = 25A62100nReverse Recovery ChargeQrrdi/dt = 100A/µS(Note3)150200n <th>Parameter</th> <th>Symbol</th> <th>Condition</th> <th>Min</th> <th>Тур</th> <th>Max</th> <th>Unit</th>	Parameter	Symbol	Condition	Min	Тур	Max	Unit
Zero Gate Voltage Drain CurrentIosJosVosSo1µGate-Body Leakage CurrentIoss $V_{DS}$ =55V, $V_{GS}$ =0V1µGate-Body Leakage CurrentIoss $V_{GS}$ =±20V, $V_{DS}$ =0V1µGate Threshold Voltage $V_{GS}(m)$ $V_{OS}$ =±20V, $V_{DS}$ =0V24NDrain-Source On-State Resistance $R_{DS}(CN)$ $V_{GS}$ =10V, $I_0$ =25A8.415mForward Transconductance $g_{FS}$ $V_{DS}$ =25V, $I_0$ =25A20225Dynamic Characteristics (Note4)Input Capacitance $C_{Css}$ $V_{DS}$ =25V, $V_{GS}$ =0V, F=1.0MHz1300POutput Capacitance $C_{css}$ $V_{DS}$ =25V, $V_{GS}$ =0V, F=1.0MHz1300PSwitching Characteristics (Note 4)Input Capacitance $C_{css}$ 12nTurn-on Delay Time $t_{d(en)}$ $V_{DS}$ =28V, $I_P$ =25A60nTurn-Off Delay Time $t_{d(en)}$ $V_{GS}$ =10V, $R_{GEN}$ =4.5Ω40nTurn-Off Fall Time $t_t$ $V_{DS}$ =44V, $I_P$ =25A, $V_{GS}$ =10V42nGate-Source Charge $Q_{gs}$ $V_{GS}$ =0V, $I_S$ =25A0.851.2NDiode Forward Voltage (Note 3) $V_{SD}$ $V_{GS}$ =0V, $I_S$ =25A62100nDiode Forward Current (Note 2) $I_S$ Is49NReverse Recovery Time $t_{rr}$ $T_J$ = 25°C, $I_F$ = 25A62100nReverse Recovery ChargeQrrdi/dt = 100A/µS(Note3)150	Off Characteristics	·	·	•			
Gate-Body Leakage Current $I_{OSS}$ $V_{GS}=\pm 20V, V_{DS}=0V$ $\pm 100$ nOn Characteristics (Note 3)Gate Threshold Voltage $V_{GS}(m)$ $V_{DS}=V_{GS, I_D}=250\muA$ 24NDrain-Source On-State Resistance $R_{DS(ON)}$ $V_{GS}=10V, I_D=25A$ 8.415mForward Transconductance $g_{FS}$ $V_{DS}=25V, I_D=25A$ 2055Dynamic Characteristics (Note4)Input Capacitance $C_{Iss}$ $V_{DS}=25V, V_{GS}=0V, F=1.0MHz$ 1300PReverse Transfer Capacitance $C_{rss}$ $V_{DS}=25V, V_{GS}=0V, F=1.0MHz$ 350PSwitching Characteristics (Note 4)Turn-on Delay Time $t_{d(on)}$ $V_{CS}=10V, I_D=25A$ 60nTurn-Off Delay Time $t_{d(off)}$ $V_{CS}=10V, I_D=25A, V_{CS}=10V$ 40nnTotal Gate Charge $Q_{gg}$ $V_{DS}=44V, I_D=25A, V_{CS}=10V$ 9nnGate-Drain Charge $Q_{gg}$ $V_{CS}=10V, I_S=25A, V_{CS}=10V$ 9nnDide Forward Voltage (Note 3) $V_{SD}$ $V_{GS}=0V, I_S=25A, V_{CS}=10V$ 9nDide Forward Current (Note 2)Is $I_S$ $I_S$ $I_S$ $I_S$ Dide Forward Current (Note 2)Is $I_S$ $I_S$ $I_S$ $I_S$ Reverse Recovery Time $t_{rr}$ $T_J = 25^{\circ}C, IF = 25A, G2I_SI_SI_SInde Forward Current (Note 2)IsI_SI_SI_SI_SI_SInde Forward Current (Note 2)IsI_S$	Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250µA	55			V
$\begin{array}{ c c c c c c } \hline \textbf{On Characteristics (Note 3)} \\ \hline \textbf{Gate Threshold Voltage} & V_{GS(th)} & V_{DS}=V_{GS,1b}=250\muA & 2 & 4 & M \\ \hline \textbf{Drain-Source On-State Resistance} & \textbf{R}_{DS(ON)} & V_{GS}=10V, 1_{D}=25A & 8.4 & 15 & m \\ \hline \textbf{Forward Transconductance} & \textbf{g}_{FS} & V_{DS}=25V, 1_{D}=25A & 20 & & & & & & \\ \hline \textbf{Dynamic Characteristics (Note4)} & & & & & & \\ \hline \textbf{Input Capacitance} & \textbf{C}_{Iss} & & V_{DS}=25V, V_{GS}=0V, \\ \hline \textbf{Dutput Capacitance} & \textbf{C}_{Iss} & & V_{DS}=25V, V_{GS}=0V, \\ \hline \textbf{Cutput Capacitance} & \textbf{C}_{rss} & & & & & \\ \hline \textbf{Reverse Transfer Capacitance} & \textbf{C}_{rss} & & & & & \\ \hline \textbf{Switching Characteristics (Note 4)} & & & & \\ \hline \textbf{Turn-on Delay Time} & \textbf{t}_{d(on)} & & & & \\ \hline \textbf{Turn-on Delay Time} & \textbf{t}_{d(off)} & V_{DS}=28V, I_{D}=25A & & & & & \\ \hline \textbf{Turn-onf Fall Time} & \textbf{t}_{f} & & & & \\ \hline \textbf{Cate Charge} & \textbf{Q}_{g} & & & & \\ \hline \textbf{Cate Charge} & \textbf{Q}_{g} & & & & \\ \hline \textbf{Cate Charge} & \textbf{Q}_{g} & & & & \\ \hline \textbf{Cate Charge} & \textbf{Q}_{g} & & & & \\ \hline \textbf{Cate Charge} & \textbf{Q}_{g} & & & & \\ \hline \textbf{Cate Charge} & \textbf{Q}_{g} & & & & \\ \hline \textbf{Cate Charge} & \textbf{Q}_{gg} & & & & \\ \hline \textbf{Cate Charge} & \textbf{Q}_{gg} & & & & \\ \hline \textbf{Cate Charge} & \textbf{Q}_{gg} & & & & \\ \hline \textbf{Cate Charge} & \textbf{Ntote 3} & & & \\ \hline \textbf{Diode Forward Voltage (Note 3)} & V_{SD} & V_{SD} & V_{GS}=0V, I_{S}=25A & & & \\ \hline \textbf{Cate Forward Voltage (Note 3)} & V_{SD} & & & \\ \hline \textbf{Cate Forward Voltage (Note 3)} & & & \\ \hline \textbf{Cate Reverse Recovery Time} & & & \\ \hline \textbf{Turn} & & & \\ \hline \textbf{Cate Reverse Recovery Time} & & & \\ \hline \textbf{Cate Forward Current (Note 2)} & & \\ \hline \textbf{Is} & & & & & \\ \hline \textbf{Cate Forward Current (Note 2)} & & \\ \hline \textbf{Reverse Recovery Time} & & & \\ \hline \textbf{Trr} & & \\ \hline \textbf{Tat 2 S^{c}, IF = 25A} & & \\ \hline \textbf{G22 100} & \textbf{n} \\ \hline \textbf{Reverse Recovery Charge} & & \\ \hline \textbf{Cate Forward Current (Note 2)} & & \\ \hline \textbf{Is} & & & \\ \hline \textbf{Cate Forward Current (Note 2)} & & \\ \hline \textbf{Is} & & & \\ \hline \textbf{Cate Forward Current (Note 2)} & & \\ \hline \textbf{Is} & & \\ \hline \textbf{Cate Forward Current (Note 2)} & & \\ \hline \textbf{Is} & & \\ \hline \textbf{Cate Forward Current (Note 2)} & \\ \hline \textbf{Is} & & \\ \hline \textbf{Cate Forward Current (Note 2)} & \\ \hline \textbf$	Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =55V,V <sub>GS</sub> =0V			1	μA
Gate Threshold Voltage $V_{GS(th)}$ $V_{DS}=V_{GS,ID}=250\mu$ A24ADrain-Source On-State Resistance $R_{DS(ON)}$ $V_{GS}=10V, I_D=25A$ 8.415mForward Transconductance $g_{FS}$ $V_{DS}=25V, I_D=25A$ 2065Dynamic Characteristics (Note4)Input Capacitance $C_{ISS}$ $V_{DS}=25V, V_{GS}=0V, F=1.0MHz$ 1300POutput Capacitance $C_{ISS}$ $V_{DS}=25V, V_{GS}=0V, F=1.0MHz$ 85PSwitching Characteristics (Note 4) $V_{DS}=28V, I_D=25A$ 60nTurn-on Delay Time $t_{d(on)}$ $V_{GS}=10V, R_{GEN}=4.5\Omega$ 40nTurn-Off Delay Time $t_{d(off)}$ $V_{GS}=10V, R_{GEN}=4.5\Omega$ 40nTurn-Off Fall Time $t_f$ $V_{GS}=44V, I_D=25A, V_{GS}=10V$ 42nGate-Source Charge $Q_{gd}$ $V_{GS}=44V, I_D=25A, V_{GS}=10V$ 9nDide Forward Voltage (Note 3) $V_{SD}$ $V_{GS}=0V, I_S=25A, V_{GS}=10V$ 42nDide Forward Current (Note 2) $I_S$ $V_{GS}=0V, I_S=25A, V_{GS}=25A, V_{GS}=10V$ 49AReverse Recovery Time $t_r$ $TJ=25^\circ$ C, IF=25A, C62100nReverse Recovery ChargeQrrdi/dt=100A/µS(Note3)150200n	Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V,V <sub>DS</sub> =0V			±100	nA
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	On Characteristics (Note 3)						
Forward Transconductance $g_{FS}$ $V_{DS}=25V, I_D=25A$ 2035Dynamic Characteristics (Note4)Input Capacitance $C_{Iss}$ $V_{DS}=25V, V_{GS}=0V, F=1.0MHz$ 1300POutput Capacitance $C_{oss}$ $V_{DS}=25V, V_{GS}=0V, F=1.0MHz$ 350PReverse Transfer Capacitance $C_{rss}$ $V_{DS}=25V, V_{GS}=0V, F=1.0MHz$ 85PSwitching Characteristics (Note 4) $V_{cos}=10MHz$ 12nTurn-on Delay Time $t_{d(on)}$ $V_{DD}=28V, I_D=25A$ 60nTurn-Off Delay Time $t_{d(off)}$ $V_{GS}=10V, R_{GEN}=4.5\Omega$ 40nTurn-Off Fall Time $t_t$ $V_{DS}=44V, I_D=25A, V_{GS}=10V$ 42nGate-Source Charge $Q_{gg}$ $V_{GS}=10V$ 15nGate-Drain Charge $Q_{gd}$ $V_{GS}=0V, I_S=25A$ 0.851.2NDiode Forward Voltage (Note 3) $V_{SD}$ $V_{GS}=0V, I_S=25A$ 0.851.2NDiode Forward Current (Note 2) $I_S$ TJ = 25°C, IF = 25A62100nReverse Recovery Time $t_{rr}$ $TJ = 25^\circ$ C, IF = 25A62100nReverse Recovery Charge $Q_{rr}$ $di/dt = 100A/\mu_S(Note3)$ 150200n	Gate Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS}=V_{GS}$ , $I_{D}=250\mu A$	2		4	V
Dynamic Characteristics (Note4)Input CapacitanceCliss Cliss $V_{DS}=25V, V_{GS}=0V, F=1.0MHz$ 1300POutput CapacitanceCoss $C_{rss}$ $V_{DS}=25V, V_{GS}=0V, F=1.0MHz$ 350PReverse Transfer CapacitanceCrss $F=1.0MHz$ 85PSwitching Characteristics (Note 4)Turn-on Delay Time $t_{d(ofn)}$ $V_{DD}=28V, I_D=25A$ 60nTurn-on Rise Timetr $V_{OS}=10V, R_{GEN}=4.5\Omega$ 40nnTurn-Off Delay Time $t_{d(off)}$ $V_{GS}=10V, R_{GEN}=4.5\Omega$ 40nTotal Gate Charge $Q_{g}$ $V_{DS}=44V, I_D=25A, V_{GS}=10V$ 9nGate-Source Charge $Q_{gd}$ $V_{GS}=10V$ 9nDiode Forward Voltage (Note 3) $V_{SD}$ $V_{GS}=0V, I_S=25A$ 0.851.2Diode Forward Voltage (Note 3) $V_{SD}$ $V_{GS}=0V, I_S=25A$ 62100Reverse Recovery Time $t_{rr}$ TJ = 25°C, IF = 25A62100nReverse Recovery ChargeQrrdi/dt = 100A/µS(Note3)150200n	Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =25A		8.4	15	mΩ
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Forward Transconductance	<b>g</b> fs	V <sub>DS</sub> =25V,I <sub>D</sub> =25A	20			S
Output CapacitanceCoss $V_{DS}=25V, V_{GS}=0V, F=1.0MHz$ 350PReverse Transfer CapacitanceCrssF=1.0MHz85PSwitching Characteristics (Note 4) $V_{CS}=0V, I_{D}=28V, I_{D}=25A$ 85PTurn-on Delay Time $t_{d(on)}$ $V_{DD}=28V, I_{D}=25A$ 60nTurn-Off Delay Time $t_{d(off)}$ $V_{GS}=10V, R_{GEN}=4.5\Omega$ 40nTurn-Off Fall Time $t_{f}$ $V_{DS}=44V, I_{D}=25A, V_{GS}=10V$ 42nGate-Source Charge $Q_{gg}$ $V_{DS}=44V, I_{D}=25A, V_{GS}=10V$ 9nGate-Drain Charge $Q_{gd}$ $V_{GS}=10V, I_{S}=25A$ 0.851.2NDiode Forward Voltage (Note 3) $V_{SD}$ $V_{GS}=0V, I_{S}=25A$ 0.851.2NDiode Forward Current (Note 2) $I_{S}$ TJ = 25°C, IF = 25A62100nReverse Recovery Time $t_{rr}$ TJ = 25°C, IF = 25A62100nReverse Recovery ChargeQrrdi/dt = 100A/µs(Note3)150200n	Dynamic Characteristics (Note4)	·	·	•			
$\begin{array}{ c c c c c } \hline \mbox{Output Capacitance} & C_{oss} & F=1.0 \mbox{MHz} & 350 & P \\ \hline \mbox{Reverse Transfer Capacitance} & C_{rss} & F=1.0 \mbox{MHz} & 85 & P \\ \hline \mbox{Switching Characteristics (Note 4)} & & & & & & & & \\ \hline \mbox{Switching Characteristics (Note 4)} & & & & & & & & & & & \\ \hline \mbox{Turn-on Delay Time} & $t_{d(on)}$ & $t_{d(on)}$ & $V_{DD}=28V, I_D=25A$ & 60 & & & & & & & \\ \hline \mbox{Turn-Off Delay Time} & $t_{r}$ & $V_{DD}=28V, I_D=25A$ & 60 & & & & & & & & \\ \hline \mbox{Turn-Off Fall Time} & $t_{r}$ & $V_{DS}=4V, I_D=25A$ & 40 & & & & & & & & \\ \hline \mbox{Total Gate Charge} & $Q_{g}$ & $V_{DS}=4V, I_D=25A$ & $0.85$ & $1.2$ & $n$ & & & & & \\ \hline \mbox{Gate-Source Charge} & $Q_{gd}$ & $V_{GS}=10V$ & & & & & & & & & \\ \hline \mbox{Data Fall Time} & $t_{r}$ & $V_{DS}=4V, I_D=25A$ & $0.85$ & $1.2$ & $n$ & & & & & \\ \hline \mbox{Data Fall Time} & $t_{r}$ & $V_{GS}=10V$ & & & & & & & & \\ \hline \mbox{Data Gate Charge} & $Q_{gd}$ & $V_{GS}=10V$ & & & & & & & & \\ \hline \mbox{Data Fall Time} & $V_{SD}$ & $V_{GS}=0V, I_S=25A$ & $0.85$ & $1.2$ & $N$ & \\ \hline \mbox{Data Forward Voltage (Note 3)} & $V_{SD}$ & $V_{GS}=0V, I_S=25A$ & $0.85$ & $1.2$ & $N$ & \\ \hline \mbox{Prain-Source Diode Characteristics} & & & & & & & & & & & & & \\ \hline \mbox{Diode Forward Current (Note 2)} & $I_S$ & & & & & & & & & & & & & & & & & & &$	Input Capacitance	C <sub>lss</sub>			1300		PF
Reverse Transfer Capacitance $C_{rss}$ 85PSwitching Characteristics (Note 4)Turn-on Delay Time $t_{d(on)}$ $V_{OD}=28V, I_D=25A$ 60nTurn-on Rise Time $t_r$ $V_{DD}=28V, I_D=25A$ 60nTurn-Off Delay Time $t_{d(off)}$ $V_{GS}=10V, R_{GEN}=4.5\Omega$ 40nTurn-Off Fall Time $t_f$ 450nTotal Gate Charge $Q_g$ $V_{DS}=44V, I_D=25A, V_{GS}=10V$ 9nGate-Drain Charge $Q_{gd}$ $V_{DS}=44V, I_D=25A, V_{GS}=10V$ 9nDiode Forward Voltage (Note 3) $V_{SD}$ $V_{GS}=0V, I_S=25A$ 0.851.2NDiode Forward Current (Note 2) $I_S$ TJ = 25°C, IF = 25A62100nReverse Recovery Time $t_{rr}$ TJ = 25°C, IF = 25A62100nReverse Recovery ChargeQrrdi/dt = 100A/µs(Note3)150200n	Output Capacitance	C <sub>oss</sub>			350		PF
$ \begin{array}{c c c c c c c } \hline Turn-on Delay Time & t_{d(on)} \\ \hline Turn-on Rise Time & t_r & V_{DD} = 28V, I_D = 25A & 60 & n \\ \hline Turn-Off Delay Time & t_{d(off)} & V_{GS} = 10V, R_{GEN} = 4.5\Omega & 40 & n \\ \hline Turn-Off Fall Time & t_f & 45 & n \\ \hline Total Gate Charge & Q_g & V_{DS} = 44V, I_D = 25A, \\ \hline Gate-Source Charge & Q_{gd} & V_{GS} = 10V & 15 & n \\ \hline Gate-Drain Charge & Q_{gd} & V_{SD} & V_{GS} = 10V & 15 & n \\ \hline Drain-Source Diode Characteristics & & & \\ \hline Diode Forward Voltage (Note 3) & V_{SD} & V_{SD} & V_{GS} = 0V, I_S = 25A & 0.85 & 1.2 & M \\ \hline Diode Forward Current (Note 2) & I_S & & & & & \\ \hline Reverse Recovery Time & t_{rr} & TJ = 25^\circ C, IF = 25A & 62 & 100 & n \\ \hline Reverse Recovery Charge & Qrr & di/dt = 100A/\mus(Note3) & 150 & 200 & n \\ \hline \end{array}$	Reverse Transfer Capacitance	C <sub>rss</sub>	F=1.0WHZ		85		PF
Turn-on Rise Timetr $V_{DD}=28V, I_D=25A$ 60nTurn-Off Delay Time $t_{d(off)}$ $V_{GS}=10V, R_{GEN}=4.5\Omega$ 40nTurn-Off Fall Timetr45nTotal Gate Charge $Q_g$ $V_{DS}=44V, I_D=25A, V_{GS}=10V$ 42nGate-Source Charge $Q_{gs}$ $V_{GS}=10V$ 42nGate-Drain Charge $Q_{gd}$ $V_{GS}=10V$ 15nDiode Forward Voltage (Note 3) $V_{SD}$ $V_{GS}=0V, I_S=25A$ 0.851.2NDiode Forward Current (Note 2)IsTJ = 25°C, IF = 25A62100nReverse Recovery Time $t_{rr}$ TJ = 25°C, IF = 25A62100nReverse Recovery ChargeQrrdi/dt = 100A/µs(Note3)150200n	Switching Characteristics (Note 4)						
$\begin{tabular}{ c c c c c c c } \hline I & I & I & I & I & I & I & I & I & I$	Turn-on Delay Time	t <sub>d(on)</sub>			12		nS
Turn-Off Fall Timetf45nTotal Gate Charge $Q_g$ $V_{DS}=44V, I_D=25A, V_{GS}=10V$ 42nGate-Source Charge $Q_{gs}$ $V_{GS}=10V$ 9nGate-Drain Charge $Q_{gd}$ $V_{GS}=10V$ 15nDrain-Source Diode CharacteristicsDiode Forward Voltage (Note 3) $V_{SD}$ $V_{GS}=0V, I_S=25A$ 0.851.2Diode Forward Current (Note 2) $I_S$ 14949Reverse Recovery Time $t_{rr}$ $TJ = 25^{\circ}C, IF = 25A$ 62100nReverse Recovery Charge $Qrr$ di/dt = 100A/µs(Note3)150200n	Turn-on Rise Time	tr	V <sub>DD</sub> =28V,I <sub>D</sub> =25A		60		nS
Total Gate Charge $Q_g$ $V_{DS}=44V, I_D=25A, V_{GS}=10V$ 42nGate-Source Charge $Q_{gs}$ $V_{GS}=10V$ 9nGate-Drain Charge $Q_{gd}$ $V_{GS}=10V$ 15nDrain-Source Diode CharacteristicsDiode Forward Voltage (Note 3) $V_{SD}$ $V_{GS}=0V, I_S=25A$ 0.851.2NDiode Forward Current (Note 2)IsTJ = 25°C, IF = 25A62100nReverse Recovery Time $t_{rr}$ TJ = 25°C, IF = 25A62100nReverse Recovery ChargeQrrdi/dt = 100A/µs(Note3)150200n	Turn-Off Delay Time	t <sub>d(off)</sub>			40		nS
Gate-Source Charge $Q_{gs}$ $V_{DS}=44V, I_D=25A, V_{GS}=10V$ 9nGate-Drain Charge $Q_{gd}$ $V_{GS}=10V$ 15nDrain-Source Diode CharacteristicsDiode Forward Voltage (Note 3) $V_{SD}$ $V_{GS}=0V, I_S=25A$ 0.851.2NDiode Forward Current (Note 2)Is494949Reverse Recovery Time $t_{rr}$ TJ = 25°C, IF = 25A62100nReverse Recovery ChargeQrrdi/dt = 100A/µs(Note3)150200n	Turn-Off Fall Time	t <sub>f</sub>			45		nS
Gate-Source Charge $Q_{gs}$ $V_{GS}=10V$ 9nGate-Drain Charge $Q_{gd}$ $V_{GS}=10V$ 15nDrain-Source Diode CharacteristicsDiode Forward Voltage (Note 3) $V_{SD}$ $V_{GS}=0V,I_S=25A$ 0.851.2NDiode Forward Current (Note 2) $I_S$ 1549AReverse Recovery Time $t_{rr}$ $TJ = 25^{\circ}C, IF = 25A$ 62100nReverse Recovery ChargeQrrdi/dt = 100A/µs(Note3)150200n	Total Gate Charge	Qg	V 44)(1 05A		42		nC
Gate-Drain Charge $Q_{gd}$ 15nDrain-Source Diode CharacteristicsDiode Forward Voltage (Note 3) $V_{SD}$ $V_{GS}=0V,I_S=25A$ 0.851.2NDiode Forward Current (Note 2)Is494949Reverse Recovery Time $t_{rr}$ TJ = 25°C, IF = 25A62100nReverse Recovery ChargeQrrdi/dt = 100A/µs(Note3)150200n	Gate-Source Charge	Q <sub>gs</sub>			9		nC
Diode Forward Voltage (Note 3) $V_{SD}$ $V_{GS}=0V,I_S=25A$ 0.851.2NDiode Forward Current (Note 2)Is494949Reverse Recovery Time $t_{rr}$ TJ = 25°C, IF = 25A62100nReverse Recovery ChargeQrrdi/dt = 100A/µs(Note3)150200n	Gate-Drain Charge	Q <sub>gd</sub>	V <sub>GS</sub> =10V		15		nC
Diode Forward Current (Note 2)Is49Reverse Recovery Time $t_{rr}$ $TJ = 25^{\circ}C$ , IF = 25A62100nReverse Recovery ChargeQrrdi/dt = 100A/µs(Note3)150200n	Drain-Source Diode Characteristics						
Reverse Recovery Time $t_{rr}$ $TJ = 25^{\circ}C$ , $IF = 25A$ 62100nReverse Recovery ChargeQrrdi/dt = 100A/µs(Note3)150200n	Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V,I <sub>S</sub> =25A		0.85	1.2	V
Reverse Recovery ChargeQrrdi/dt = 100A/µs(Note3)150200n	Diode Forward Current (Note 2)	ls				49	А
	Reverse Recovery Time	t <sub>rr</sub>	TJ = 25°C, IF = 25A 62		100	nS	
Forward Turn-On Time ton Intrinsic turn-on time is negligible (turn-on is dominated by LS+	Reverse Recovery Charge	Qrr			200	nC	
	Forward Turn-On Time	t <sub>on</sub>	Intrinsic turn-on time is negligible (turn-on is dominated by LS+L				y LS+LD)

#### Notes:

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

**2.** Surface Mounted on FR4 Board,  $t \le 10$  sec.

**3.** Pulse Test: Pulse Width  $\leq$  300µs, Duty Cycle  $\leq$  2%.

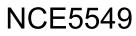
4. Guaranteed by design, not subject to production

5. EAS condition: Tj=25  $^\circ C$  ,V\_DD=28V,V\_G=10V,L=0.5mH,Rg=25\Omega



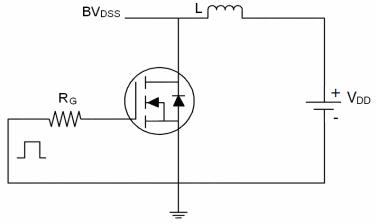
http://www.ncepower.com

Pb Free Product

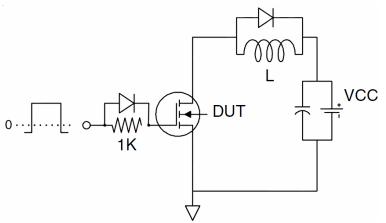


## **Test circuit**

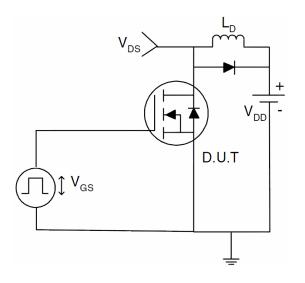
1)  $E_{AS}$  test Circuits



2) Gate charge test Circuit:



3) Switch Time Test Circuit:



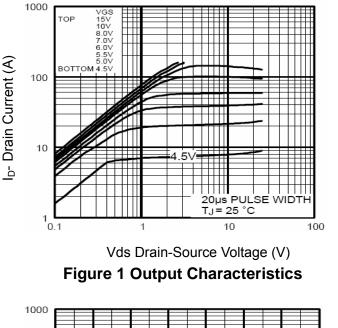


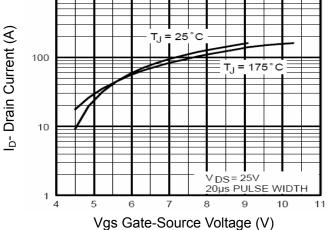


http://www.ncepower.com

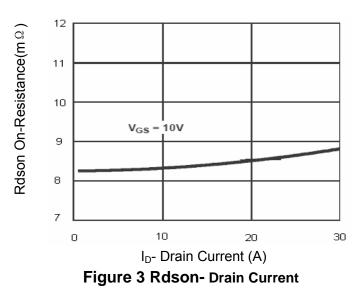
# NCE5549

### **TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)**





**Figure 2 Transfer Characteristics** 



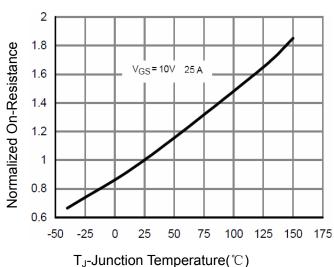
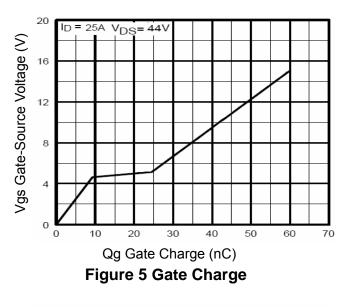


Figure 4 Rdson-JunctionTemperature



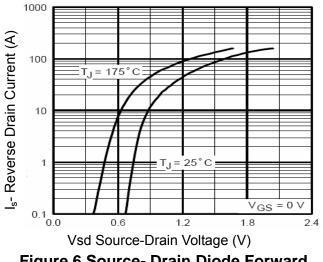


Figure 6 Source- Drain Diode Forward



1

0.1

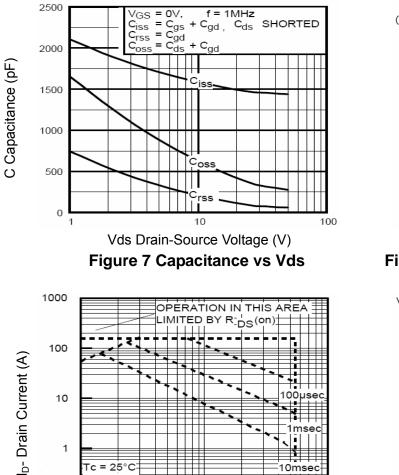
Гс = 25°С

Tj = 175°C

Single Pulse







10

Vds Drain-Source Voltage (V)

Figure 8 Safe Operation Area

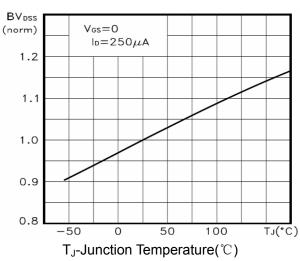


Figure 9 **BV**<sub>DSS</sub> vs Junction Temperature

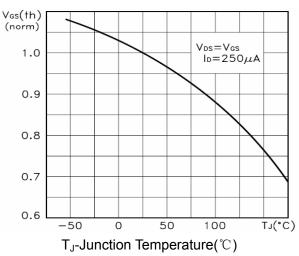
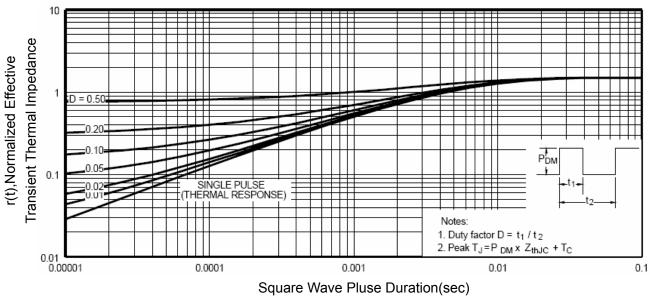


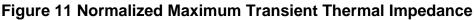
Figure 10 V<sub>GS(th)</sub> vs Junction Temperatur



Ś

10msec

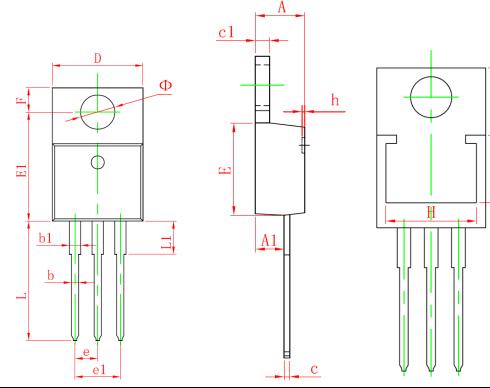
100





## NCE5549

## **TO-220-3L Package Information**



Grumbal	Dimensions	In Millimeters	Dimensions In Inches		
Symbol	Min	Max	Min	Max	
Α	4.470	4.670	0.176	0.184	
A1	2.520	2.820	0.099	0.111	
b	0.710	0.910	0.028	0.036	
b1	1.170	1.370	0.046	0.054	
c	0.330	0.650	0.013	0.026	
c1	1.200	1.400	0.047	0.055	
D	10.010	10.350	0.394	0.407	
Ε	8.500	8.900	0.335	0.350	
E1	12.060	12.460	0.475	0.491	
e	2.540	(TYP.)	0.100 (TYP.)		
e1	4.980	5.180	0.196	0.204	
F	2.590	2.890	0.102	0.114	
Н	8.440 REF.		0.332 REF.		
h	0.000	0.300	0.000	0.012	
L	13.400	13.800	0.528	0.543	
L1	3.560	3.960	0.140	0.156	
V	6.360 REF.		0.250 REF.		
Ι	6.30	0 REF.	0.248 REF.		
Φ	3.735	3.935	0.147	0.155	







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