NCE N-Channel Super Trench Power MOSFET

Description

The NCEP1545AK uses **Super Trench** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g. This device is ideal for high-frequency switching and synchronous rectification.

Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

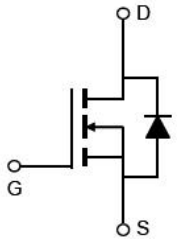
General Features

- V_{DS} =150V,I_D =45A
  $R_{DS(ON)}$=22mΩ (typical) @ V_{GS}=10V
  $R_{DS(ON)}$=28mΩ (typical) @ V_{GS}=4.5V
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating

100% UIS TESTED!
100% ΔVds TESTED!

TO-220

Top View



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCEP1545A	NCEP1545A	TO-220-3L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	45	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	31.5	A
Pulsed Drain Current	I_{DM}	180	A
Maximum Power Dissipation	P_D	120	W
Derating factor		0.8	W/℃
Single pulse avalanche energy (Note 1)	E_{AS}	100	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Résistance, Junction-to-Case	$R_{\theta JC}$	1.25	℃/W

Electrical Characteristics (T_A=25℃unless otherwise noted)

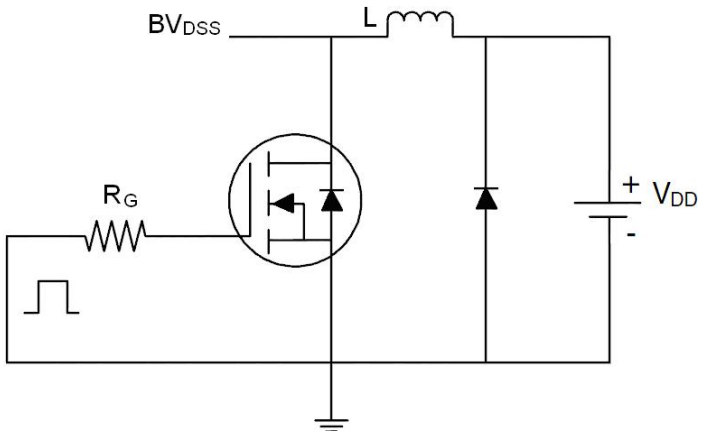
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	150	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=150V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1.2	1.7	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A	-	22	27	mΩ
		V_{GS}=4.5V, I_D=20A	-	28	35	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=20A	15	-	-	S
Dynamic Characteristics						
Input Capacitance	C_{lss}	V_{DS}=75V,V_{GS}=0V, F=1.0MHz	-	1935		PF
Output Capacitance	C_{oss}		-	145		PF
Reverse Transfer Capacitance	C_{rss}		-	11		PF
Switching Characteristics (Note 2)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=75V, R_L=7.5Ω V_{GS}=10V,R_G=3Ω	-	10	-	nS
Turn-on Rise Time	t_r		-	6.5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	16	-	nS
Turn-Off Fall Time	t_f		-	7	-	nS
Total Gate Charge	Q_g	V_{DS}=75V,I_D=20A, V_{GS}=10V	-	33	-	nC
Gate-Source Charge	Q_{gs}		-	7.2	-	nC
Gate-Drain Charge	Q_{gd}		-	7.2	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=20A	-	-	1.2	V
Diode Forward Current	I_S		-	-	45	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = I_S di/dt = 100A/μs	-	30	-	nS
Reverse Recovery Charge	Qrr		-	135	-	nC

Notes:

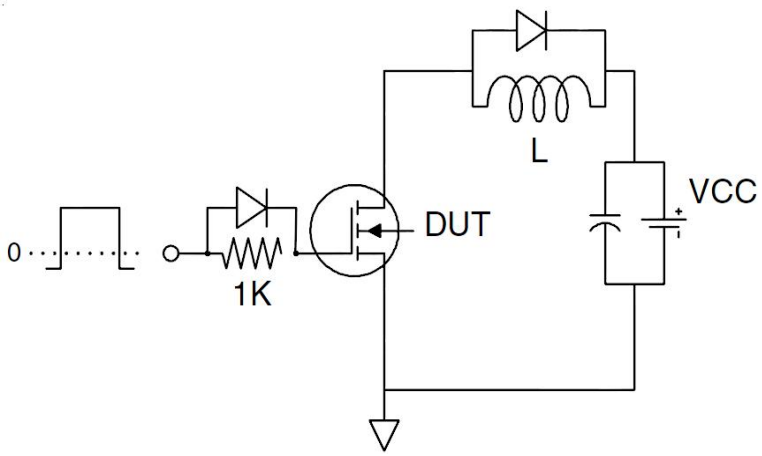
1. EAS condition : Tj=25℃,V_{DD}=50V,V_G=10V,L=0.5mH,Rg=25Ω
2. Guaranteed by design, not subject to production
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=175° C. The SOA curve provides a single pulse rating.

Test Circuit

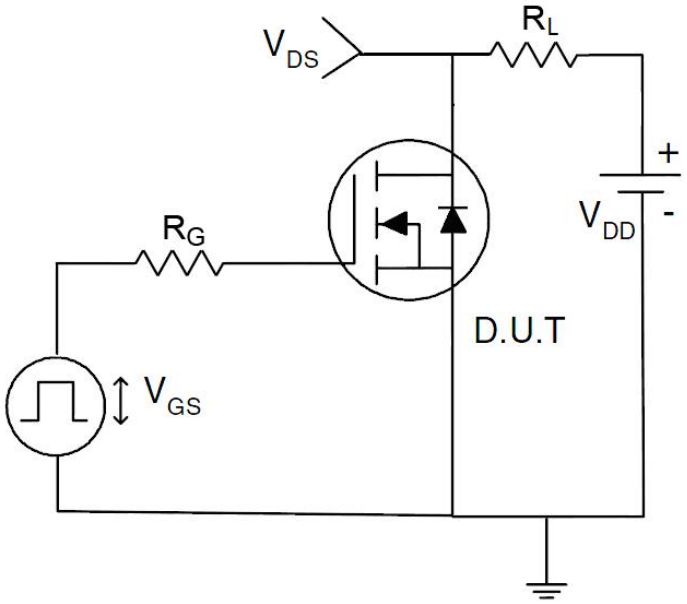
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

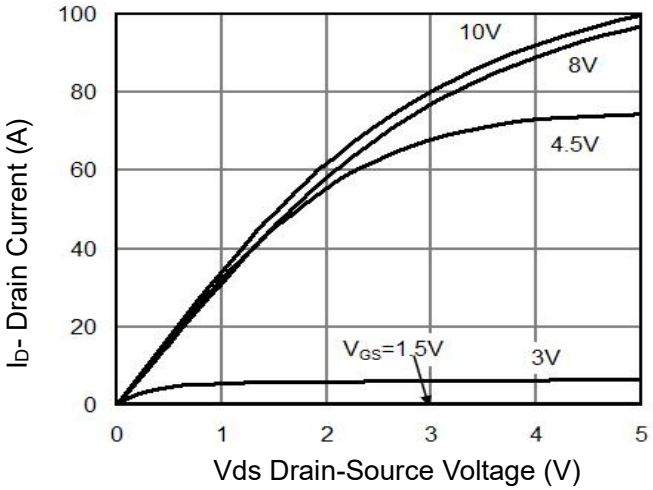


Figure 1 Output Characteristics

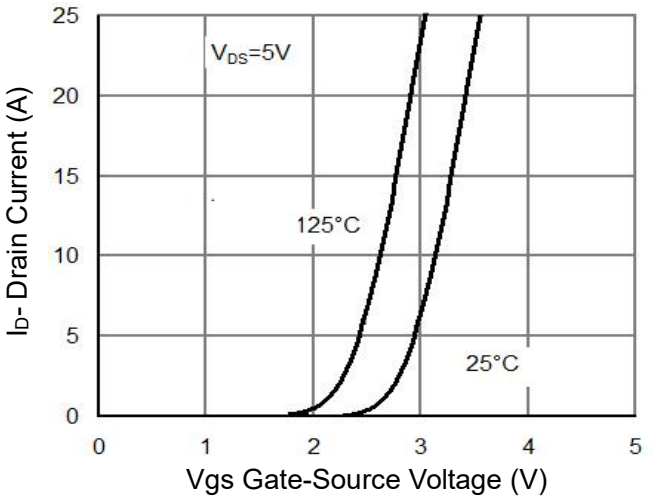


Figure 2 Transfer Characteristics

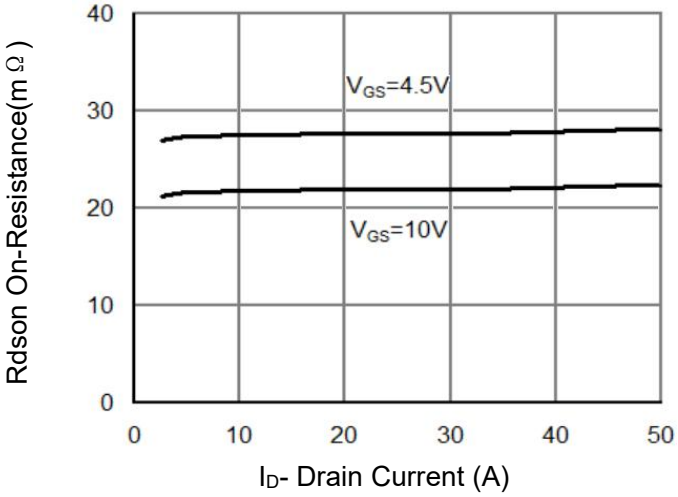


Figure 3 Rdson- Drain Current

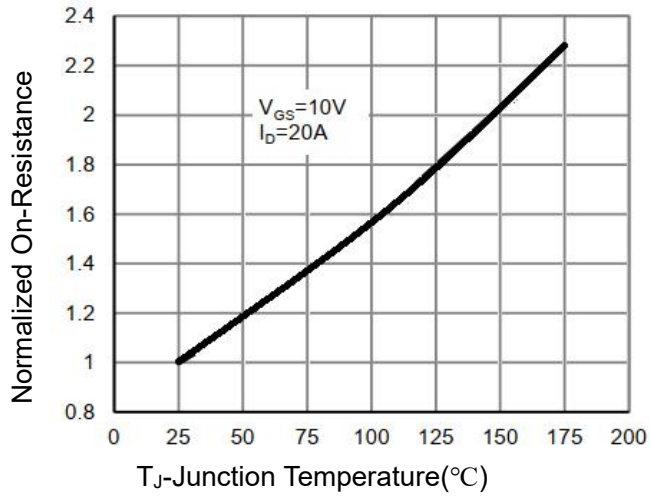


Figure 4 Rdson-Junction Temperature

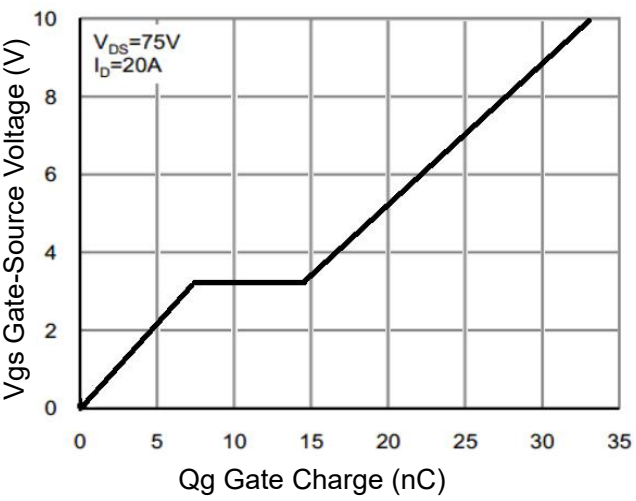


Figure 5 Gate Charge

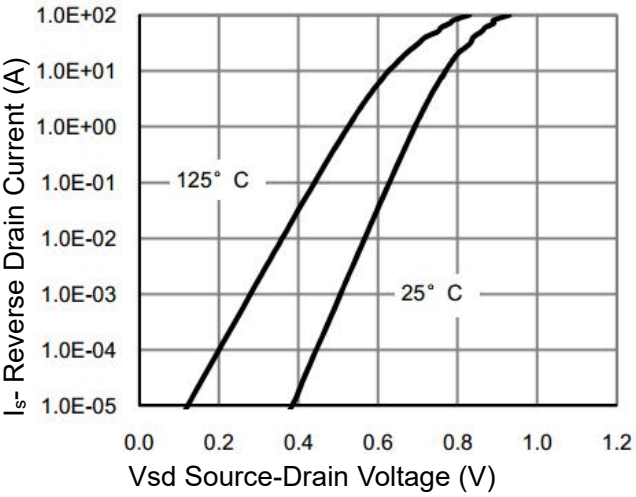


Figure 6 Source- Drain Diode Forward

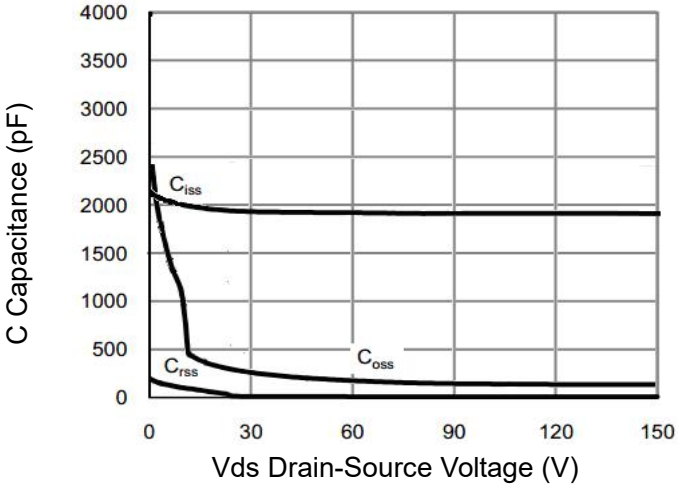


Figure 7 Capacitance vs Vds

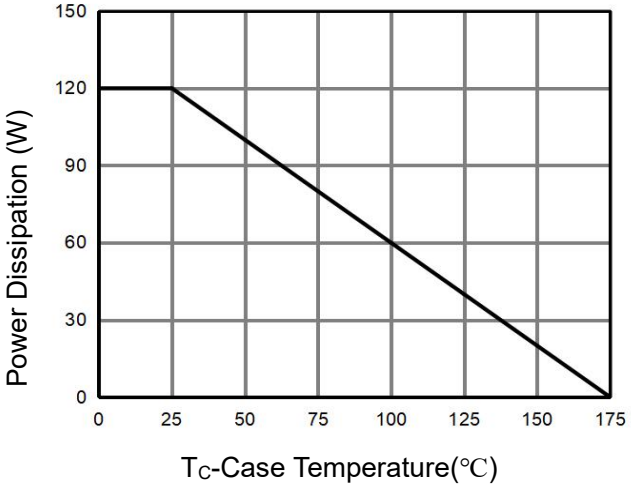


Figure 9 Power De-rating

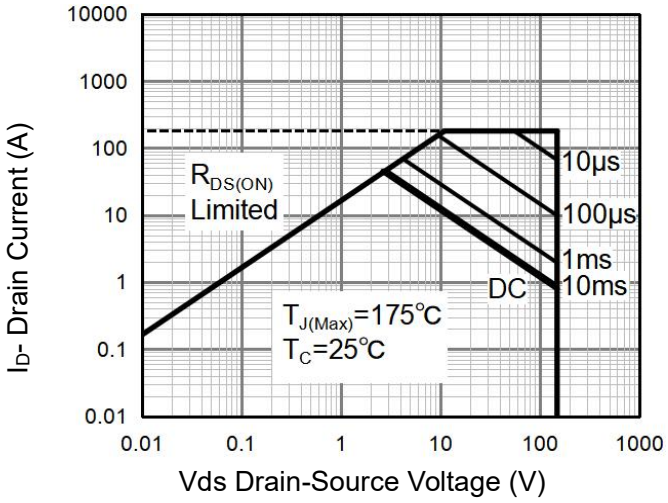


Figure 8 Safe Operation Area (Note3)

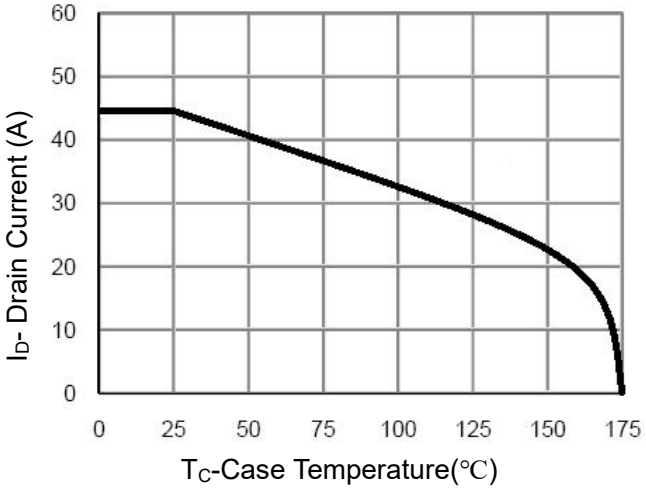


Figure 10 Current De-rating

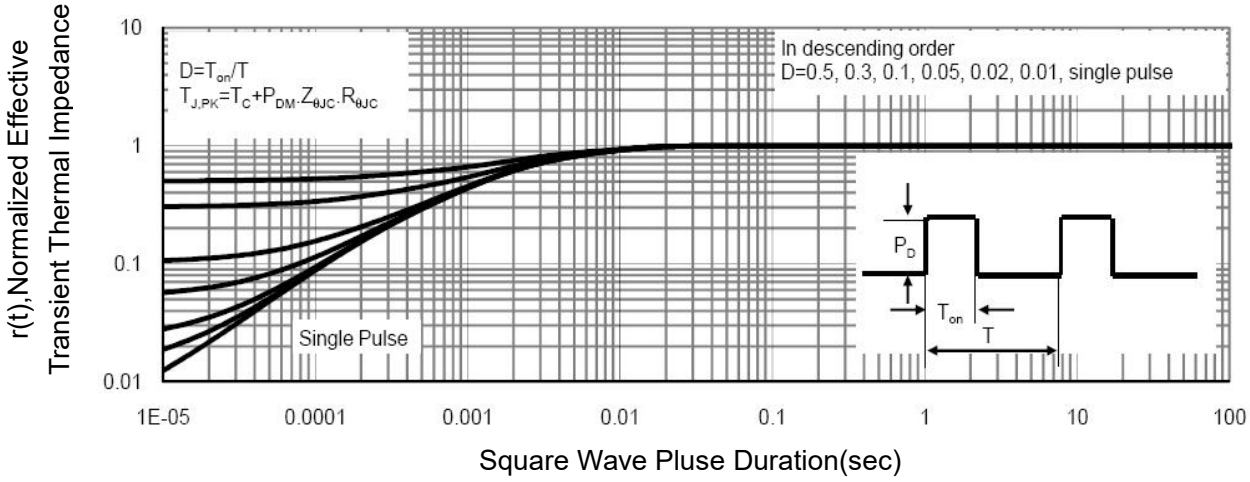
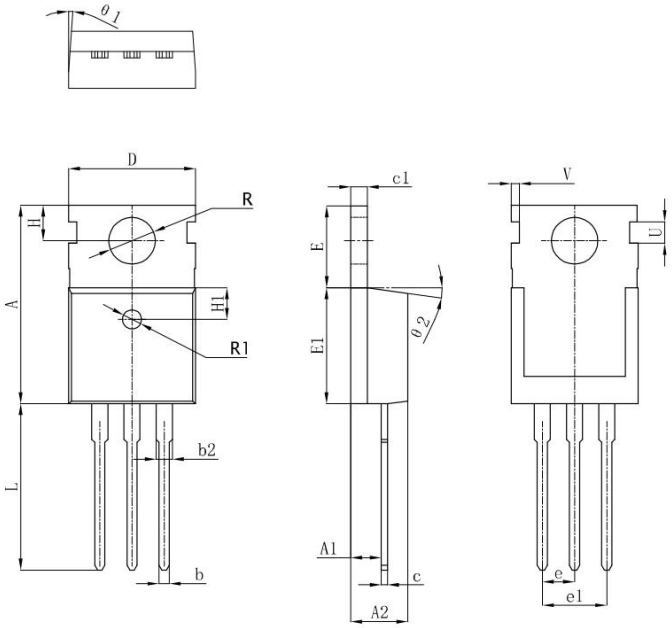


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220-3L Package Information



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	15.400	15.600	15.800
A1	2.350	2.400	2.500
A2	4.400	4.500	4.700
b	0.700	0.800	0.900
b2	1.180	1.310	1.440
c	0.480	0.500	0.560
c1	1.290	1.300	1.320
D	9.800	10.000	10.200
E	6.400	6.500	6.600
E1	9.000	9.100	9.200
e	2.420	2.540	2.660
e1	4.840	5.080	5.320
H	2.730	2.800	2.870
H1	2.400	2.500	2.600
L	13.020	13.370	13.720
R	3.500	3.600	3.630
R1	1.400	1.500	1.600
U	1.650	1.750	1.850
V	0.580	0.680	0.780
θ1	2°	2.5°	3°
θ2	6.5°	7°	7.5°

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