NCE N-Channel Enhancement Mode Power MOSFET

Description

The NCE1540AF 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.

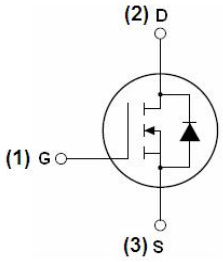
General Features

- V_{DS} =150V,I_D =20A
  $R_{DS(ON)}$ < 35mΩ @ V_{GS}=10V (Typ:30mΩ)
- 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

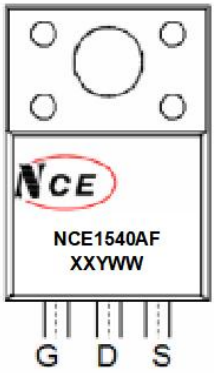
Application

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

100% UIS TESTED!
100% ΔVds TESTED!



Schematic diagram



Marking and pin assignment

TO-220F top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE1540AF	NCE1540AF	TO-220F	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous	I_D	20	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	14	A
Pulsed Drain Current	I_{DM}	60	A
Maximum Power Dissipation	P_D	37	W
Derating factor		0.3	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	320	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	3.38	℃/W
Thermal Resistance,Junction-to-Ambient(Note 2)	$R_{\theta JA}$	20	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

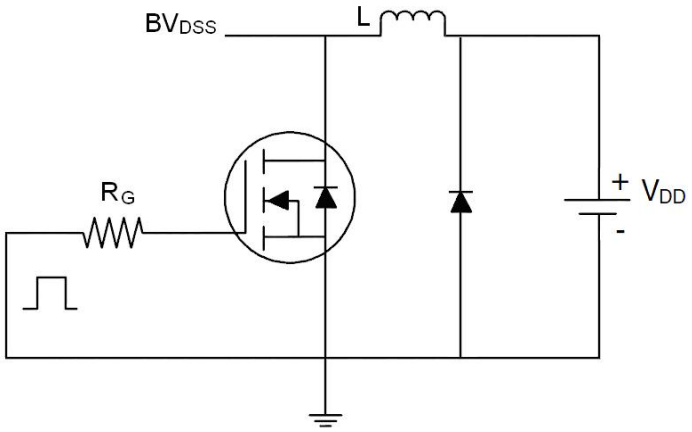
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	150	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=150V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±12V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	0.7	1.05	1.4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=18A	-	30	35	mΩ
Forward Transconductance	g_{FS}	V_{DS}=20V,I_D=18A	-	110	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=75V,V_{GS}=0V, F=1.0MHz	-	5941	-	PF
Output Capacitance	C_{oss}		-	117	-	PF
Reverse Transfer Capacitance	C_{rss}		-	85.5	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V, R_L=15Ω V_{GS}=10V,R_G=2.5Ω	-	14	-	nS
Turn-on Rise Time	t_r		-	12	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	45	-	nS
Turn-Off Fall Time	t_f		-	11	-	nS
Total Gate Charge	Q_g	V_{DS}=75V,I_D=18A, V_{GS}=10V		183	-	nC
Gate-Source Charge	Q_{gs}			12	-	nC
Gate-Drain Charge	Q_{gd}			27.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=18A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	40	A
Reverse Recovery Time	t_{rr}	TJ = 25°C, IF = 18A di/dt = 100A/μs(Note3)	-	42	-	nS
Reverse Recovery Charge	Qrr		-	75	-	nC

Notes:

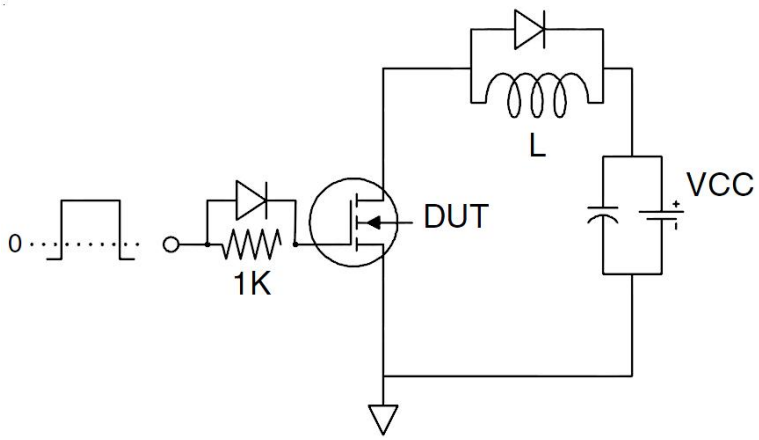
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2.The value of RθJA is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C. The valueinanygiven application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.TheRθJA isthesum of the thermal impedance from junction to case RθJC and case to ambient.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition:Tj=25℃,V_{DD}=50V,V_G=10V,L=0.5mH,Rg=25Ω

Test Circuit

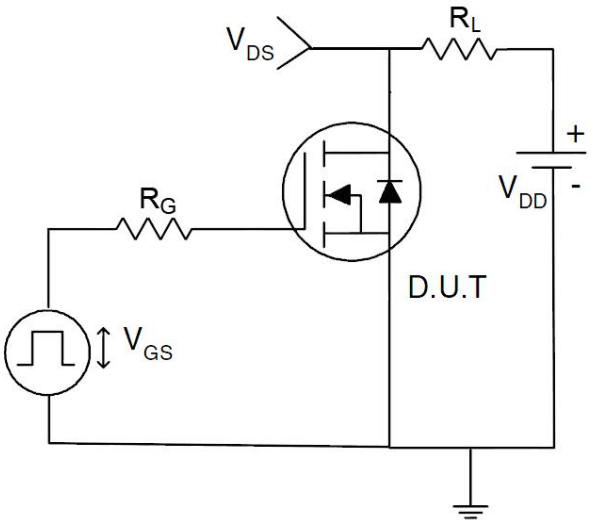
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit：



Typical Electrical and Thermal Characteristics (Curves)

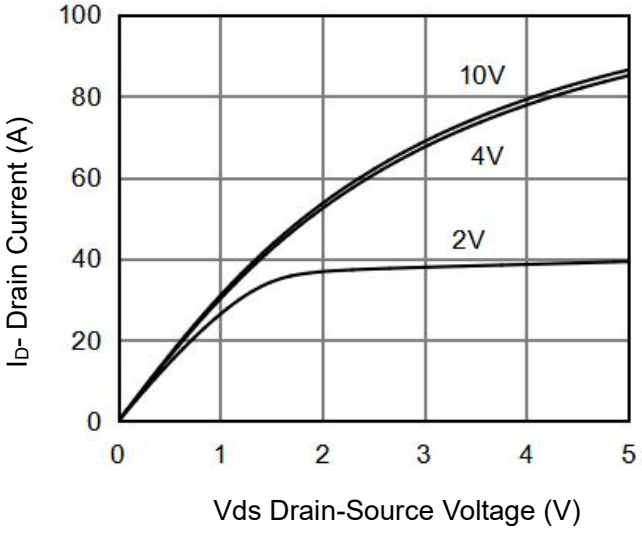


Figure 1 Output Characteristics

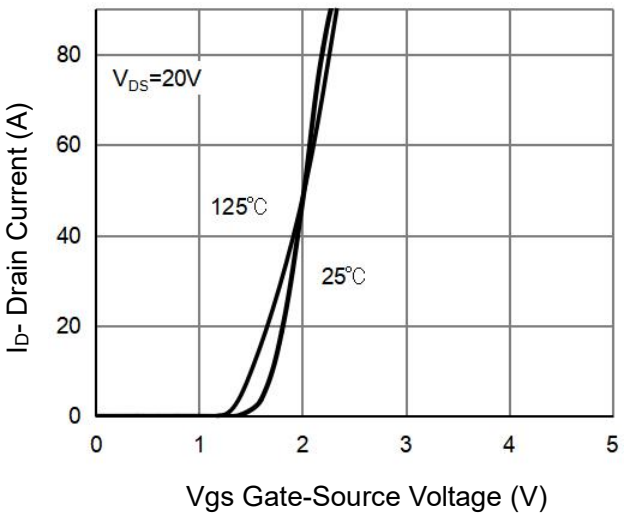


Figure 2 Transfer Characteristics

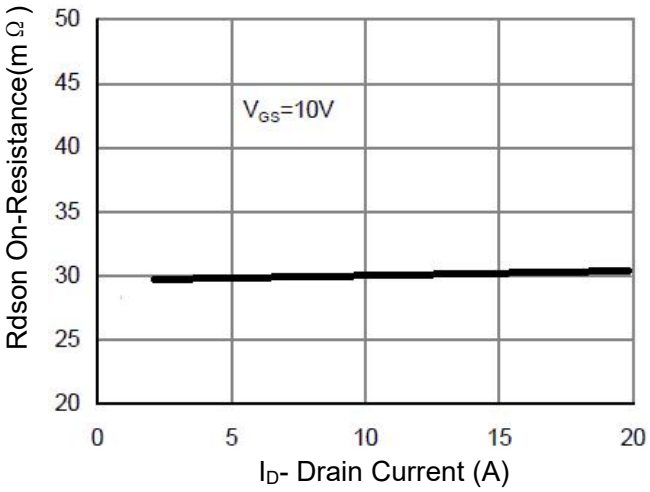


Figure 3 Rdson- Drain Current

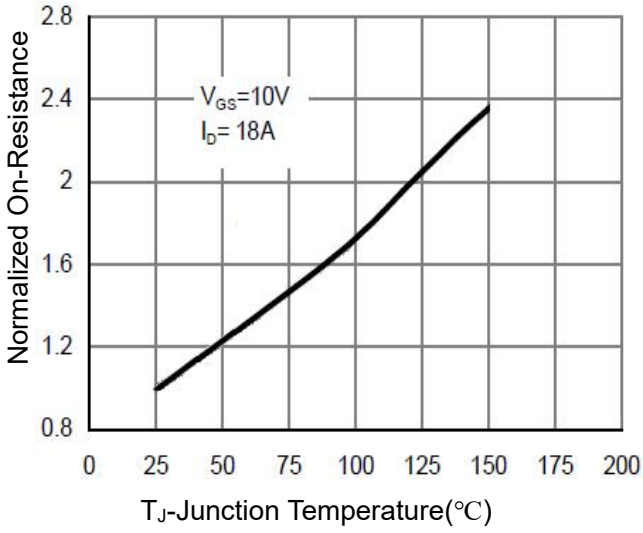


Figure 4 Rdson-JunctionTemperature

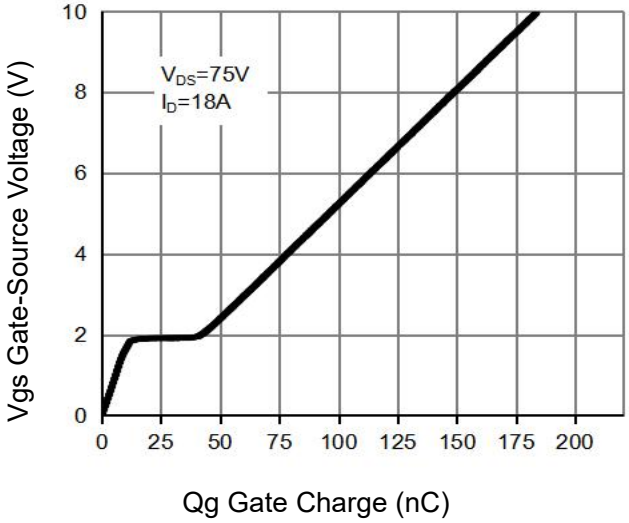


Figure 5 Gate Charge

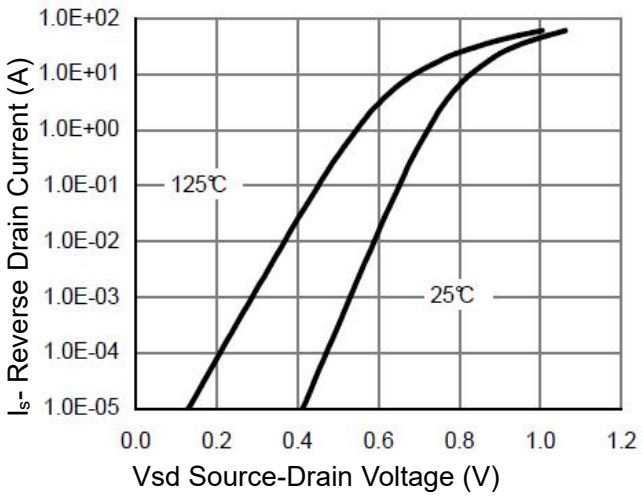


Figure 6 Source- Drain Diode Forward

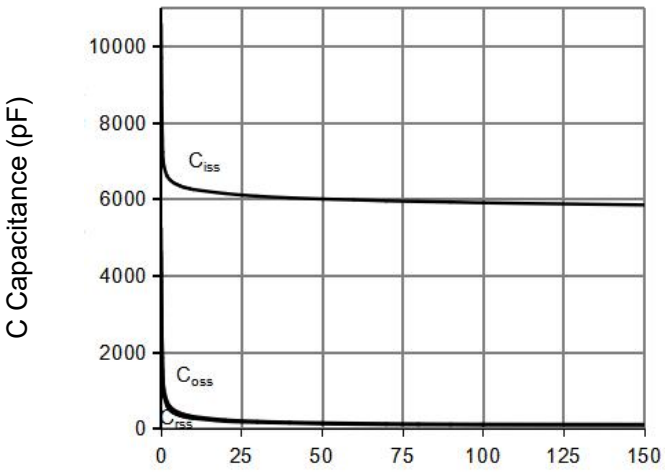


Figure 7 Capacitance vs Vds

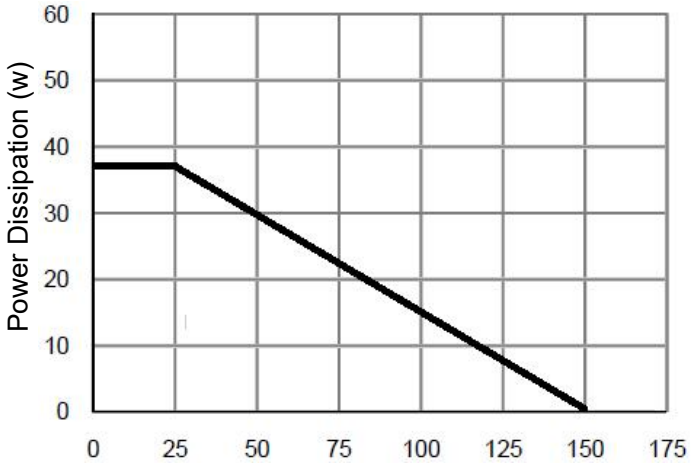


Figure 9 Power De-rating

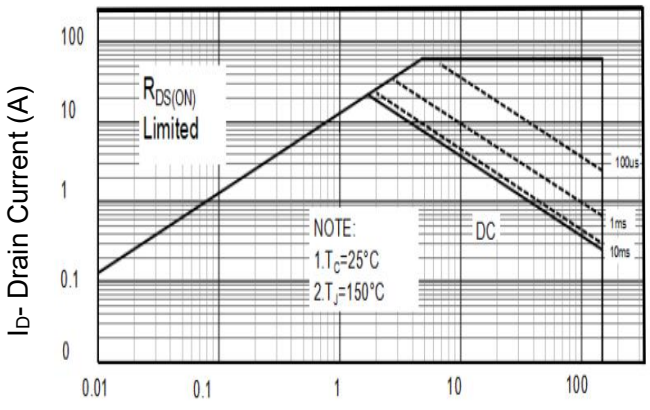


Figure 8 Safe Operation Area

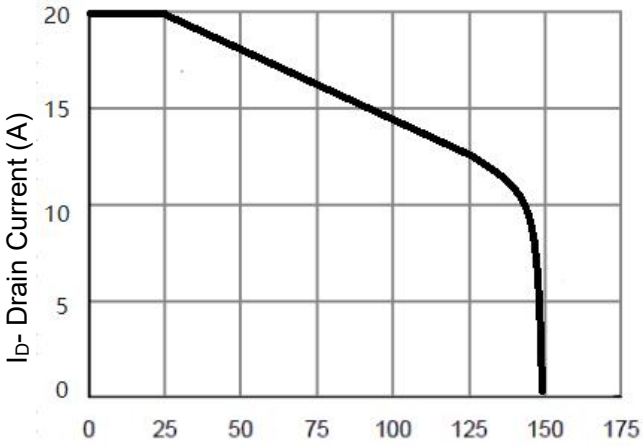


Figure 10 Current De-rating

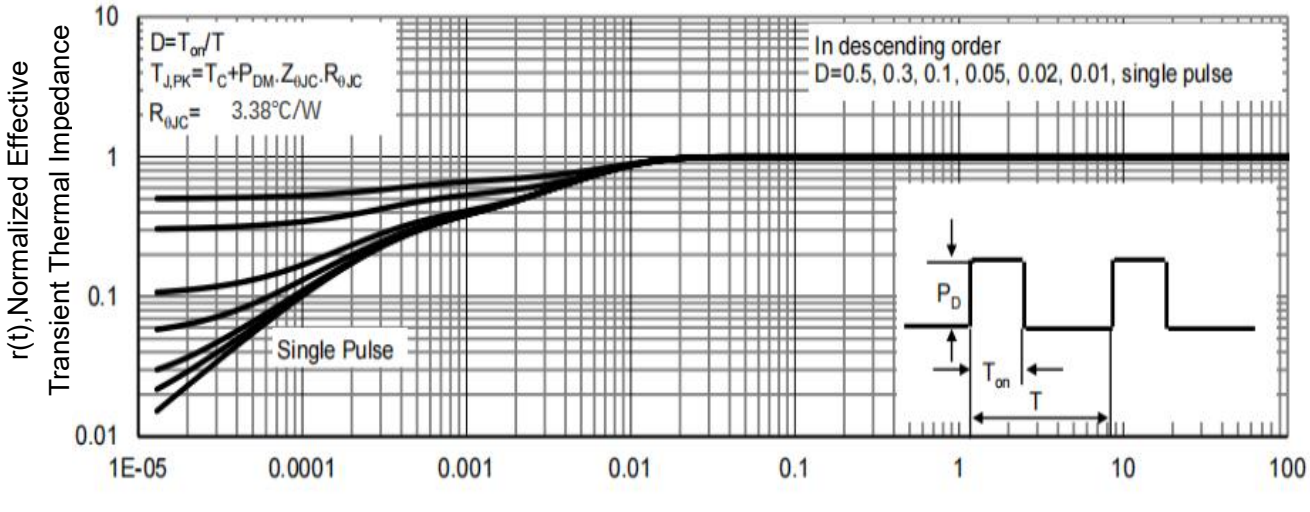
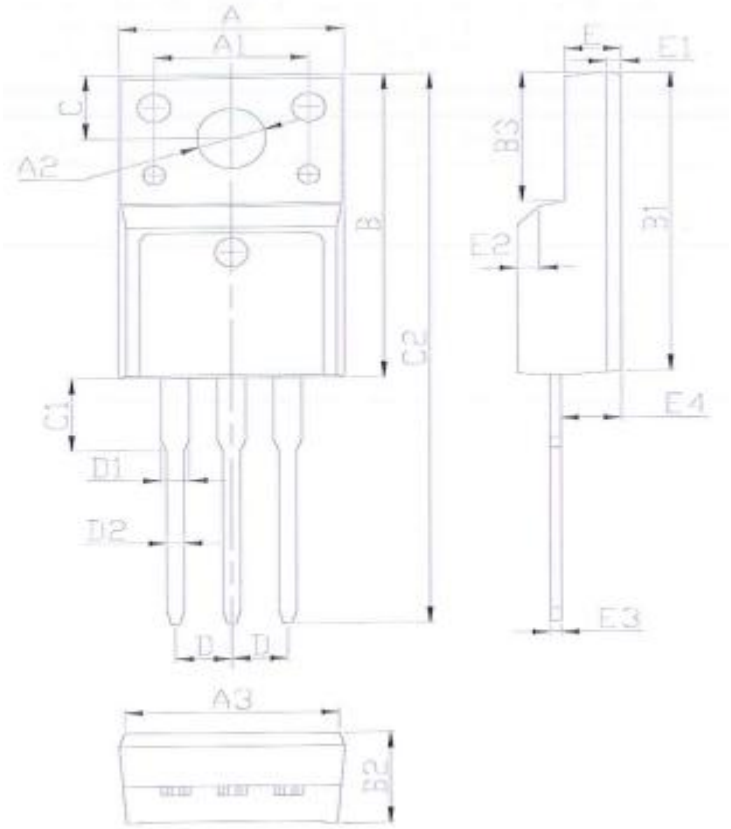


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220F Package Information



DIM	MILLIMETERS
A	10.16±0.30
A1	7.00±0.20
A2	3.12±0.20
A3	9.70±0.30
B	15.90±0.50
B1	15.60±0.50
B2	4.70±0.30
B3	6.70±0.30
C	3.30±0.25
C1	3.25±0.30
C2	28.70±0.50
D	Typical 2.54
D1	1.47 (MAX)
D2	0.80±0.20
E	2.55±0.25
E1	0.70±0.25
E2	1.0×45°
E3	0.50±0.20
E4	2.75±0.30

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