

NCE N-Channel Enhancement Mode Power MOSFET

General Description

The NCE7580 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

- $V_{DS}=75V$; $I_D=80A@V_{GS}=10V$;
 $R_{DS(ON)}<8m\Omega @V_{GS}=10V$
- Special process technology for high ESD capability
- Special designed for converters 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

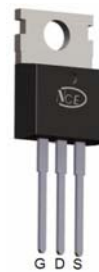
Application

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

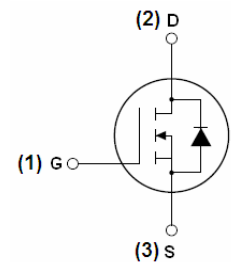
Product Summary

BV_{DSS}	typ.	84	V
$R_{DS(ON)}$	typ.	6.5	m Ω
	max.	8.0	m Ω
I_D		80	A

100% UIS TESTED!



TO-220-3L top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE7580	7580	TO-220-3L	-	-	-

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}	± 25	V
Drain Current (DC) at $T_C=25^\circ C$	$I_{D(DC)}$	80	A
Drain Current (DC) at $T_C=100^\circ C$	$I_{D(DC)}$	60	A
Drain Current-Continuous@ Current-Pulsed (Note 1)	$I_{DM(pluse)}$	320	A
Peak diode recovery voltage	dv/dt	30	V/ns
Maximum Power Dissipation($T_C=25^\circ C$)	P_D	170	W
Derating factor		1.13	W/ $^\circ C$
Single pulse avalanche energy (Note 2)	E_{AS}	580	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 : $T_J=25^\circ C, V_{DD}=50V, V_G=10V, L=0.3mH, I_D=62A$;

Table 2. Thermal Characteristic

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case (Maximum)	R_{thJC}	0.88	$^{\circ}C/W$
Thermal Resistance, Junction-to-Ambient (Maximum)	R_{thJA}	63	$^{\circ}C/W$

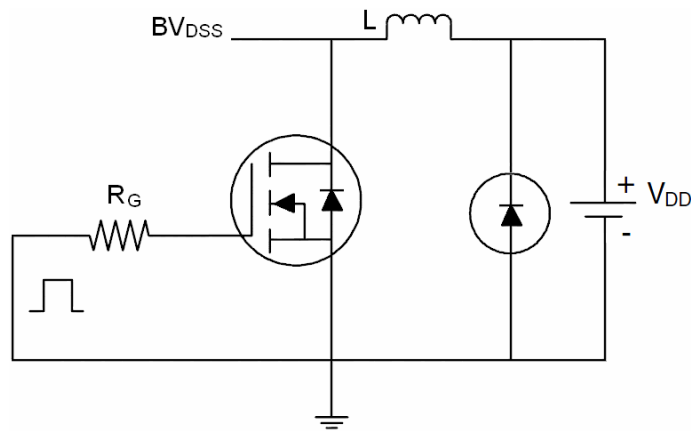
Table 3. Electrical Characteristics ($T_C=25^{\circ}C$ unless otherwise noted)

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	$R_{DS(on)}$	$V_{GS}=10V, I_D=40A$		6.5	8	m Ω
Dynamic Characteristics						
Forward Transconductance	g_{FS}	$V_{DS}=10V, I_D=40A$	20	-	-	S
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V,$ $F=1.0MHz$		4400		PF
Output Capacitance	C_{oss}			340		PF
Reverse Transfer Capacitance	C_{rss}			260		PF
Total Gate Charge	Q_g	$V_{DS}=30V, I_D=30A,$ $V_{GS}=10V$		100		nC
Gate-Source Charge	Q_{gs}			20		nC
Gate-Drain Charge	Q_{gd}			30		nC
Switching times						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, I_D=2A, R_L=15\Omega$ $V_{GS}=10V, R_G=2.5\Omega$		17.8		nS
Turn-on Rise Time	t_r			11.8		nS
Turn-Off Delay Time	$t_{d(off)}$			56		nS
Turn-Off Fall Time	t_f			14.6		nS
Source- Drain Diode Characteristics						
Source-drain current(Body Diode)	I_{SD}				80	A
Pulsed Source-drain current(Body Diode)	I_{SDM}				320	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}	$T_J=25^{\circ}C, I_F=75A, di/dt=100A/\mu s$			36	nS
Reverse Recovery Charge ^(Note 1)	Q_{rr}				56	nC
Forward Turn-on Time	t_{on}	Intrinsic turn-on time is negligible(turn-on is dominated by L_S+L_D)				

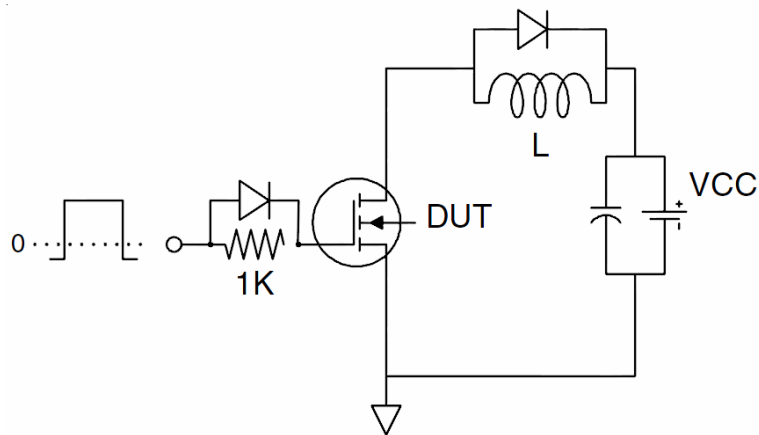
Notes 1. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 1.5\%$, $R_G=25\Omega$, Starting $T_J=25^{\circ}C$

Test Circuit

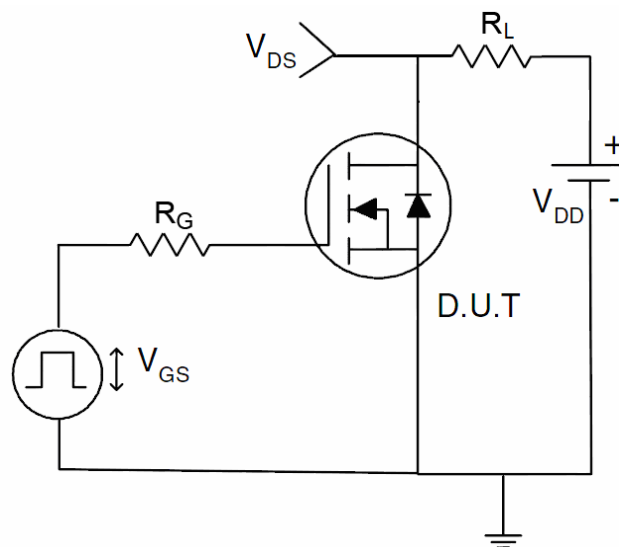
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (curves)

Figure1. Safe operating area

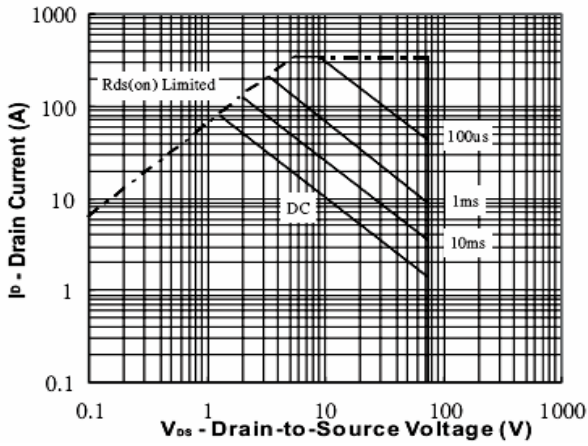


Figure2. Source-Drain Diode Forward Voltage

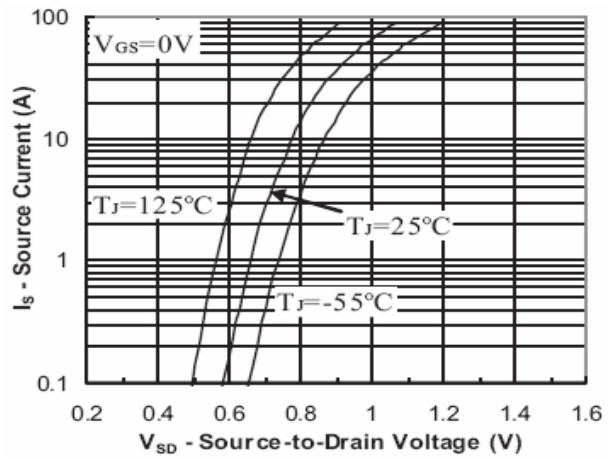


Figure3. Output characteristics

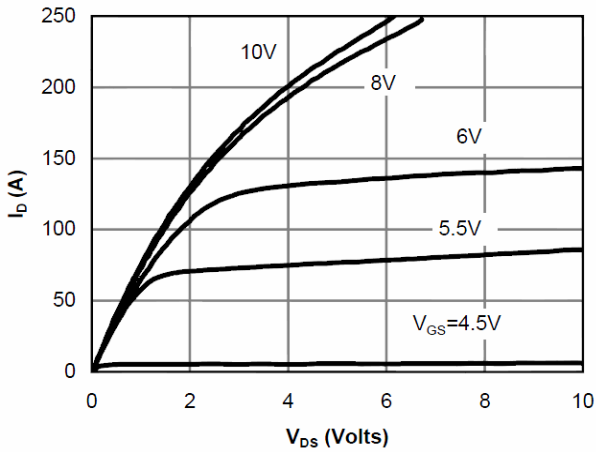


Figure4. Transfer characteristics

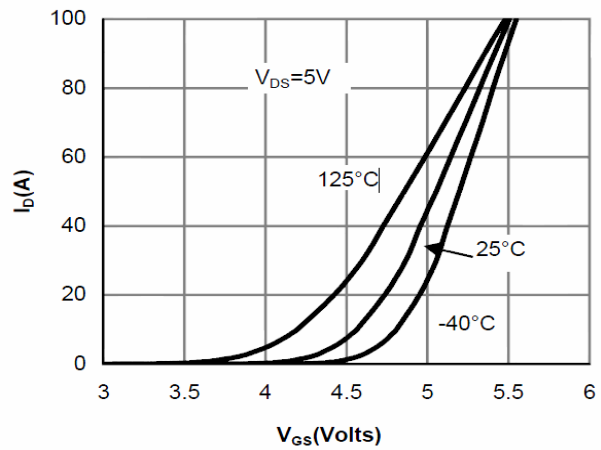


Figure5. Static drain-source on resistance

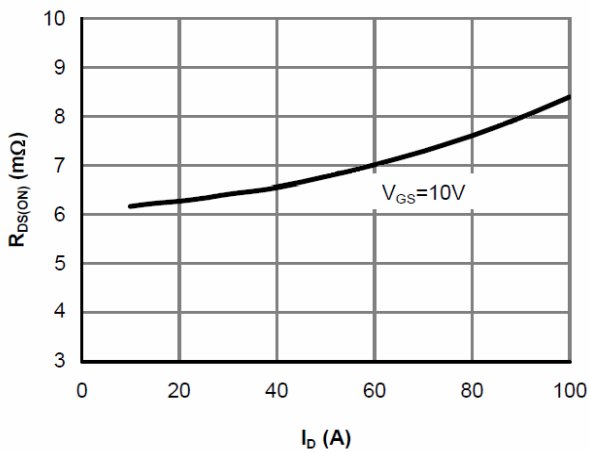


Figure6. R_{DS(ON)} vs Junction Temperature

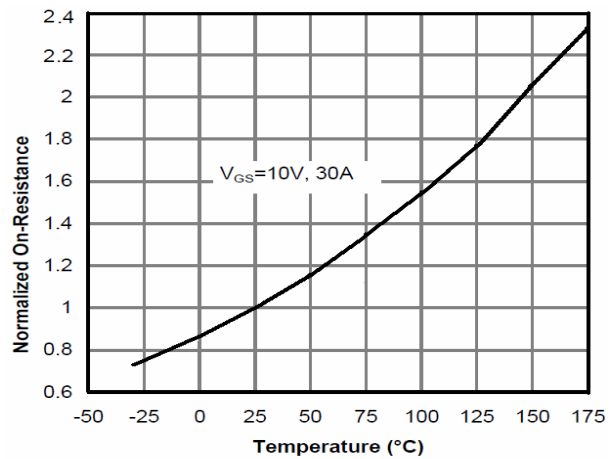


Figure7. BV_{DSS} vs Junction Temperature

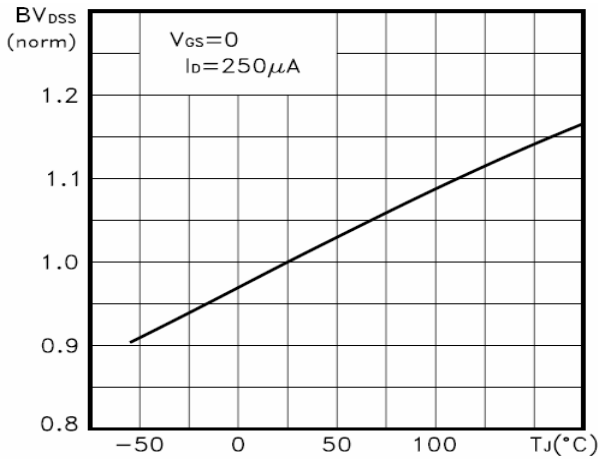


Figure8. $V_{GS(th)}$ vs Junction Temperature

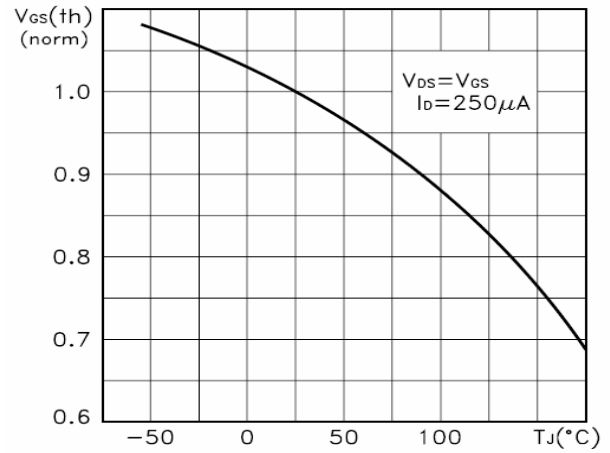


Figure9. Gate charge waveforms

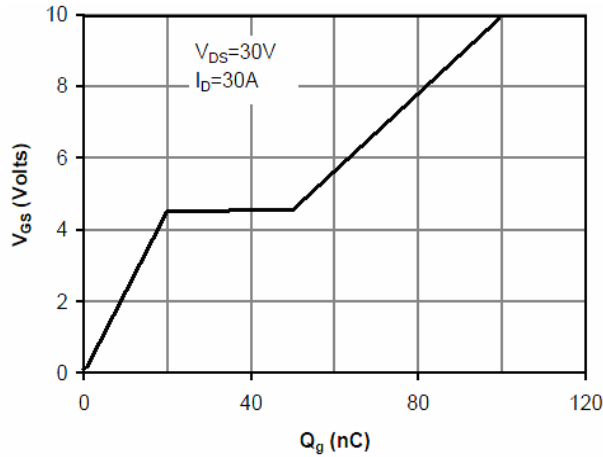
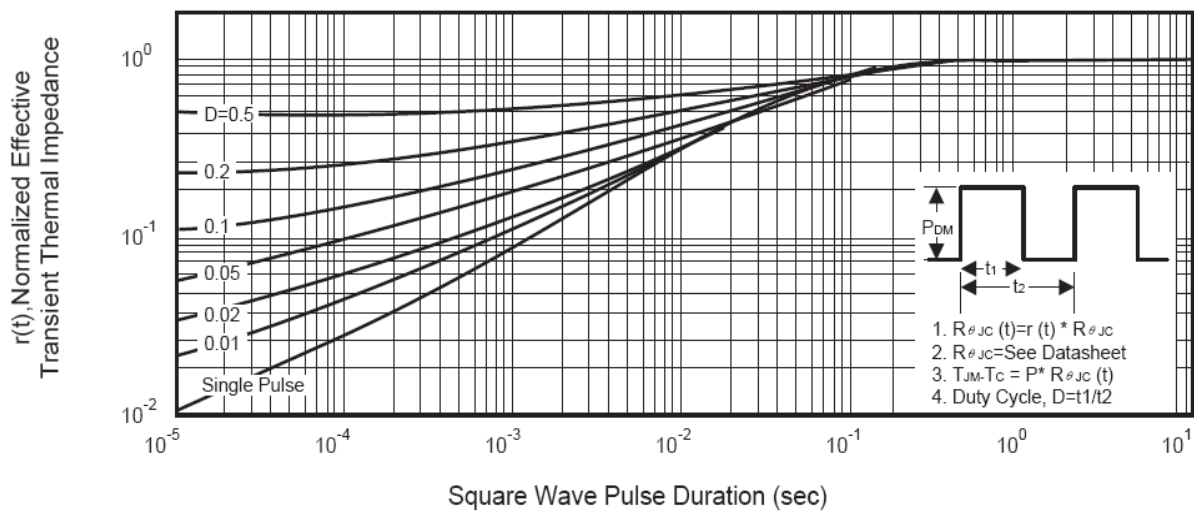
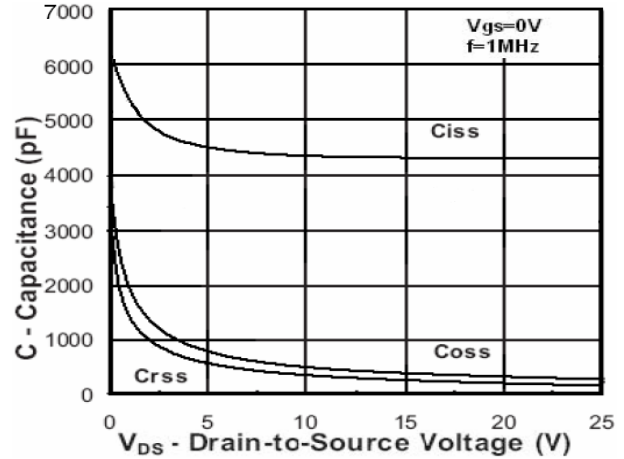
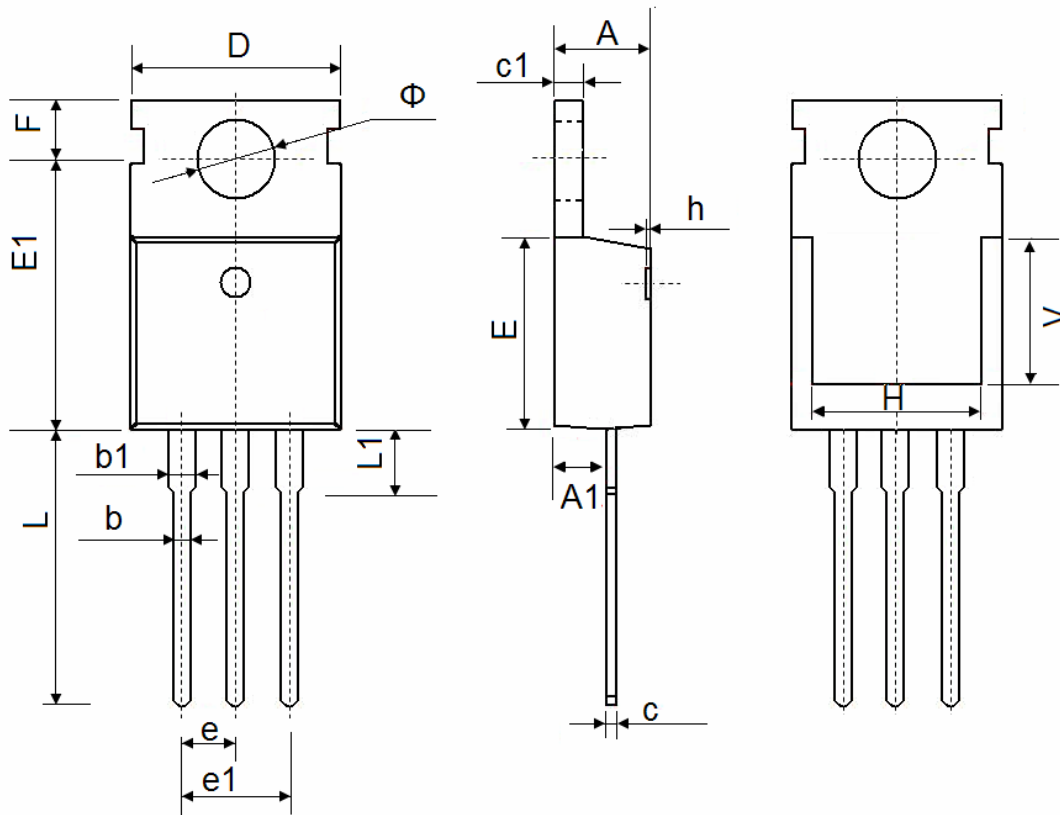


Figure10. Capacitance



TO-220-3L Package Information


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
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	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150

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