NCE P-Channel Enhancement Mode Power MOSFET

Description

The NCE60P03R uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge .This device is well suited for use as a load switch or in PWM applications.

Application

- Load switch
- PWM application

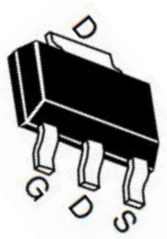
100% UIS TESTED!

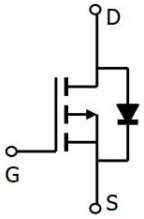
100% ΔVds TESTED!

General Features

- V_{DS} =-60V,I_D =-3A
  $R_{DS(ON)}$ <170mΩ @ V_{GS}=-10V
  $R_{DS(ON)}$ <220mΩ @ V_{GS}=-4.5V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation
- 150 °C operating temperature
- Pb-free lead plating

SOT-223-3L





Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE60P03R	NCE60P03R	SOT-223-3L	Ø330mm	16mm	2500 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous (T_A=25℃)	I_D	-3	A
Drain Current-Continuous (T_A=70℃)	I_D	-2.4	A
Pulsed Drain Current (Note 1)	I_{DM}	-12	A
Maximum Power Dissipation	P_D	2.75	W
Single pulse avalanche energy (Note 5)	E_{AS}	24	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient(Note 2)	$R_{\theta JA}$	45.5	℃/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	35	℃/W

Electrical Characteristics (T_A=25℃unless otherwise noted)

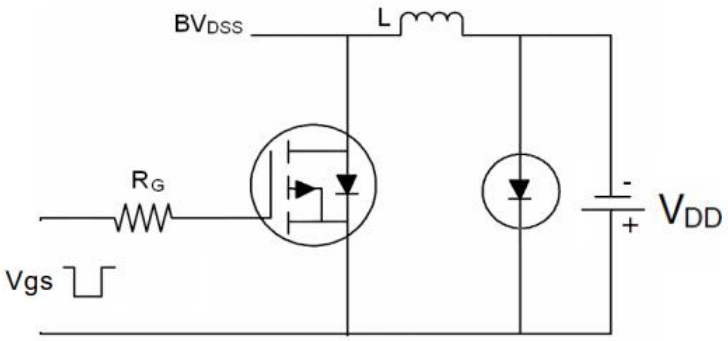
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=-250μA	-60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-60V,V_{GS}=0V	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-1.4	-2.0	-2.6	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-3A	-	148	170	mΩ
		V_{GS}=-4.5V, I_D=-3A	-	185	220	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-3A	-	3	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=-30V,V_{GS}=0V, F=1.0MHz	-	444.2	-	PF
Output Capacitance	C_{oss}		-	19.6	-	PF
Reverse Transfer Capacitance	C_{rss}		-	17.9	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-30V, I_D=-3A, V_{GS}=-10V,R_G=3Ω	-	40	-	nS
Turn-on Rise Time	t_r		-	35	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	15	-	nS
Turn-Off Fall Time	t_f		-	10	-	nS
Total Gate Charge	Q_g	V_{DS}=-30,I_D=-3A, V_{GS}=-10V	-	11.3	-	nC
Gate-Source Charge	Q_{gs}		-	2.7	-	nC
Gate-Drain Charge	Q_{gd}		-	1.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-3A	-		-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-3	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F =- 3A di/dt = -100A/μs(Note3)	-	25		nS
Reverse Recovery Charge	Qrr		-	31		nC

Notes:

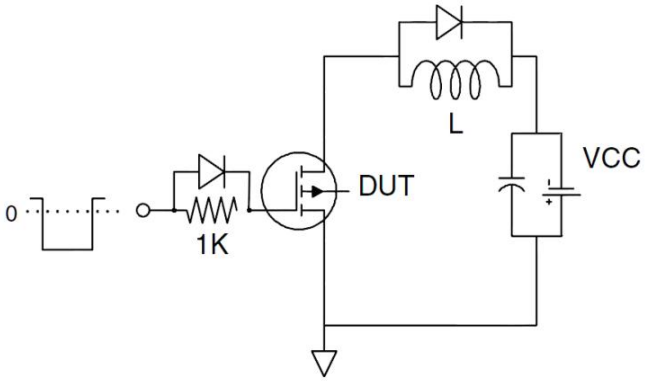
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : Tj=25℃,V_{DD}=-30V,V_G=-10V,L=0.5mH,Rg=25Ω

Test Circuit

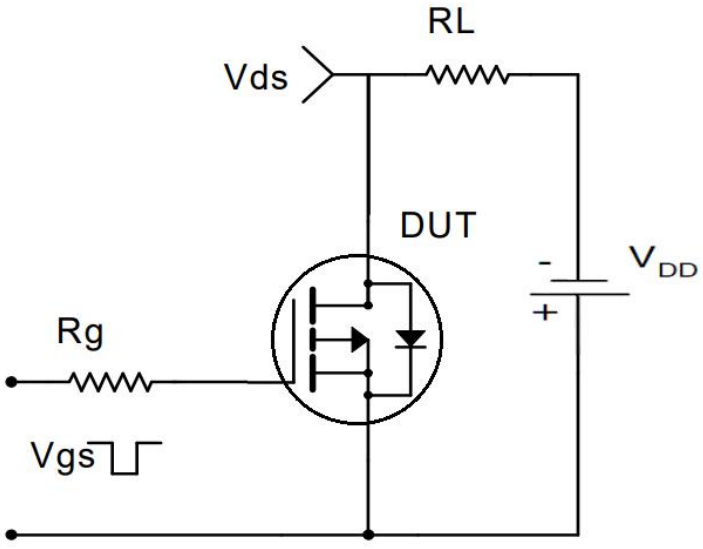
1）E_{AS} test Circuit



2）Gate charge test Circuit



3）Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

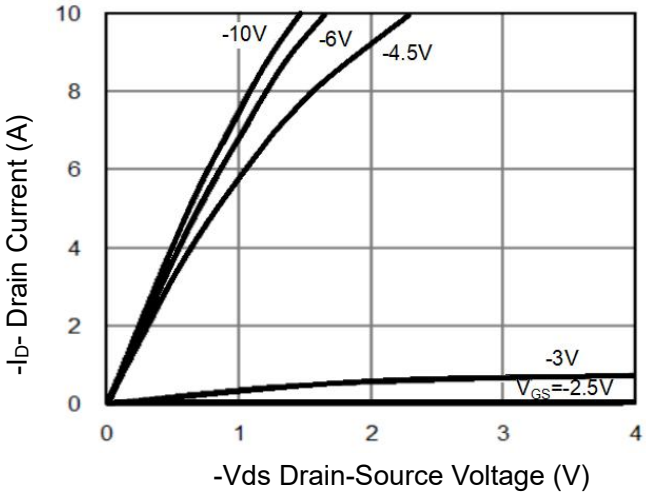


Figure 1 Output Characteristics

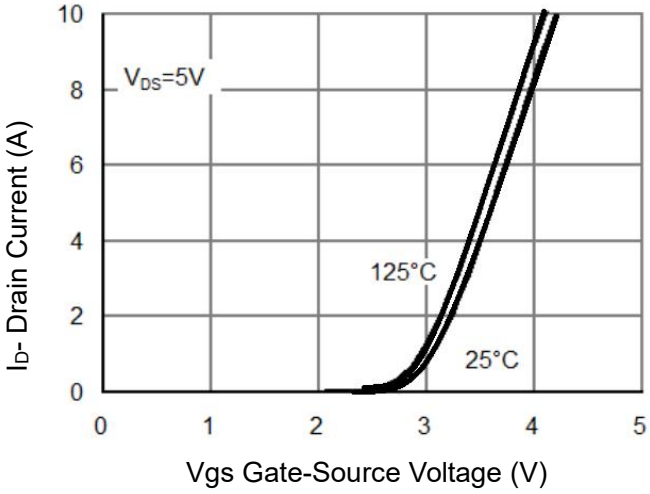


Figure 2 Transfer Characteristics

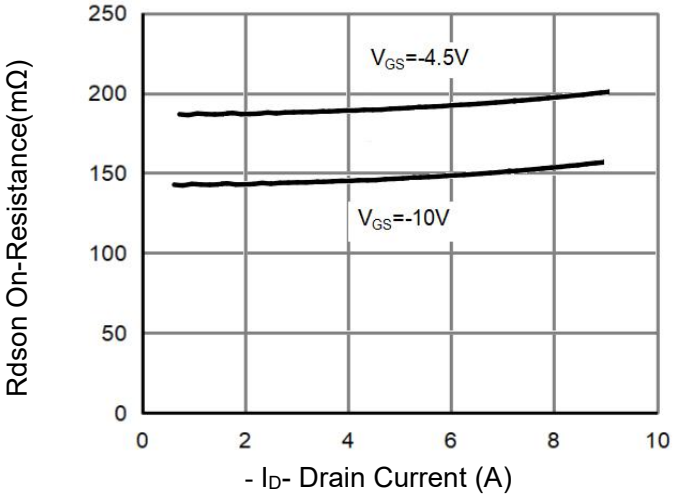


Figure 3 Rdson- Drain Current

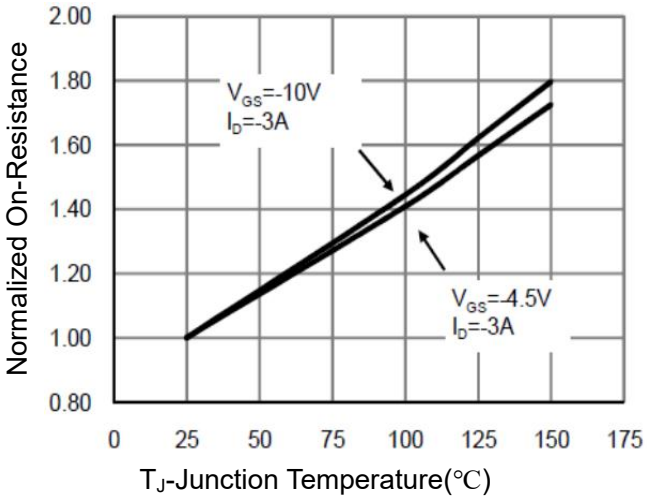


Figure 4 Rdson-Junction Temperature

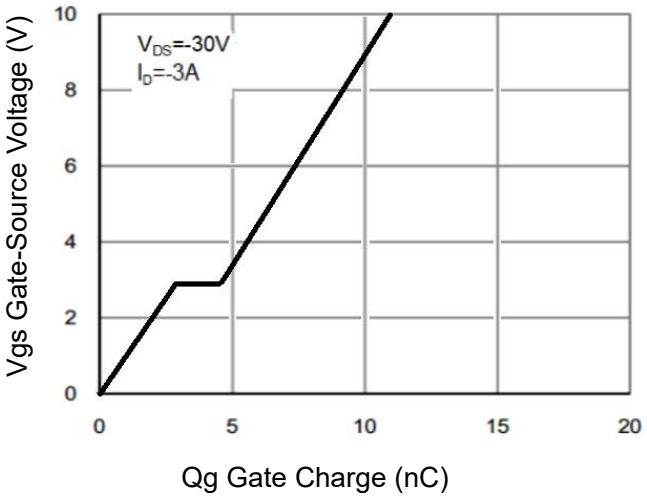


Figure 5 Gate Charge

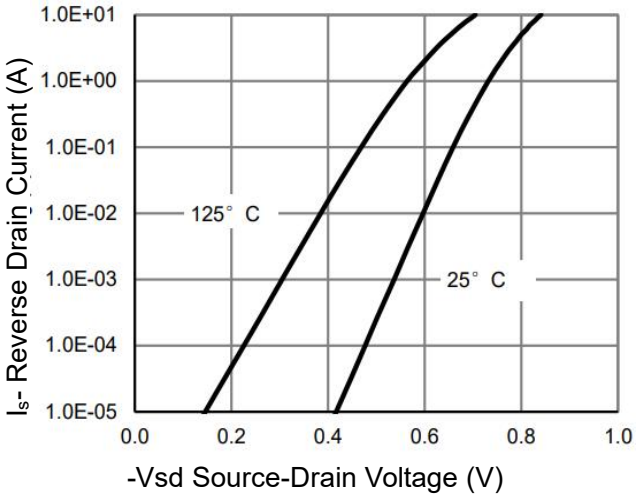


Figure 6 Source- Drain Diode Forward

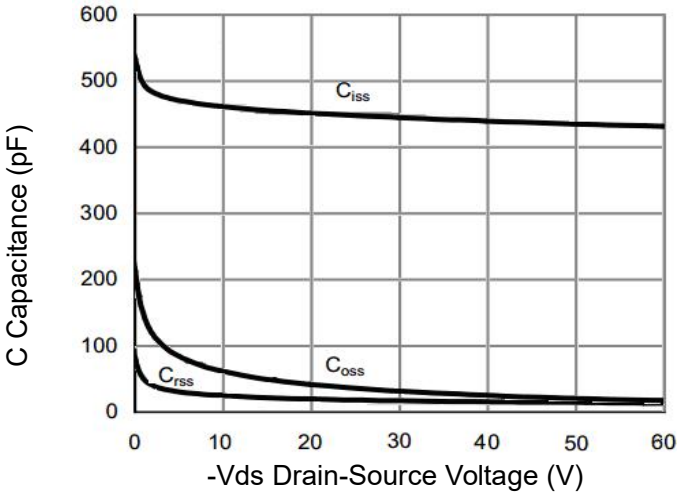


Figure 7 Capacitance vs Vds

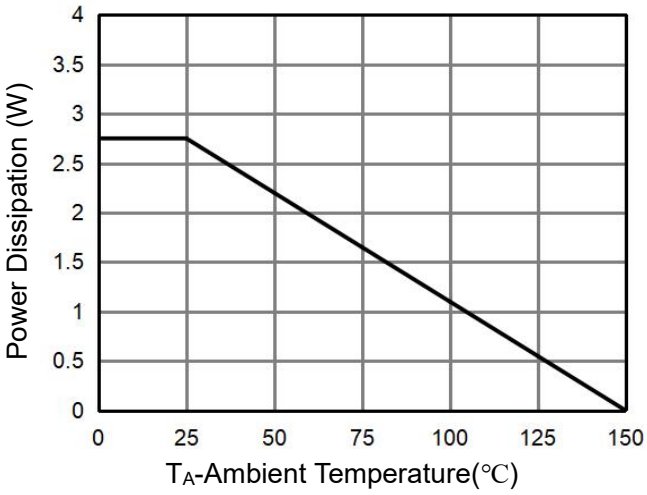


Figure 9 Power De-rating

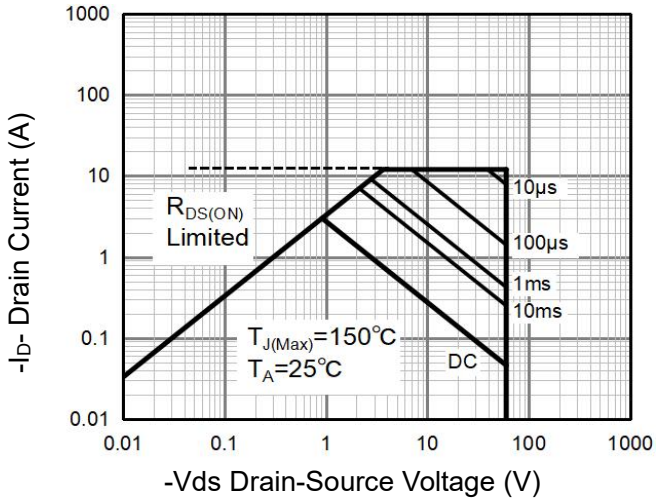


Figure 8 Safe Operation Area

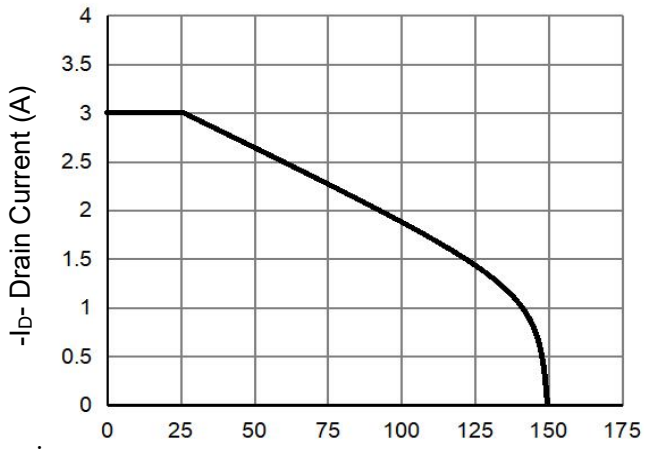


Figure 10 ID Current De-rating

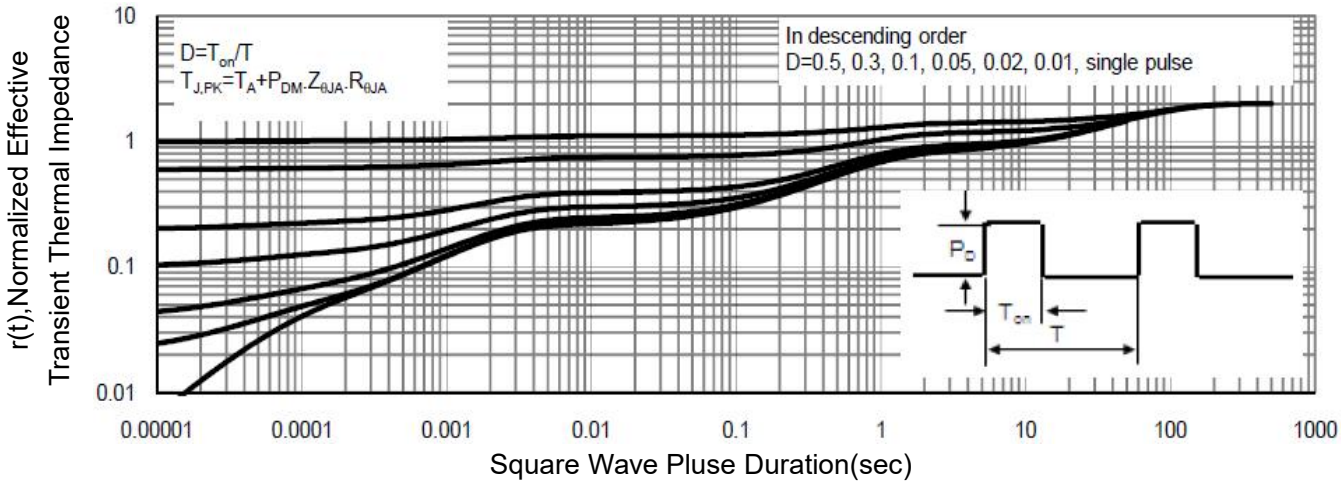
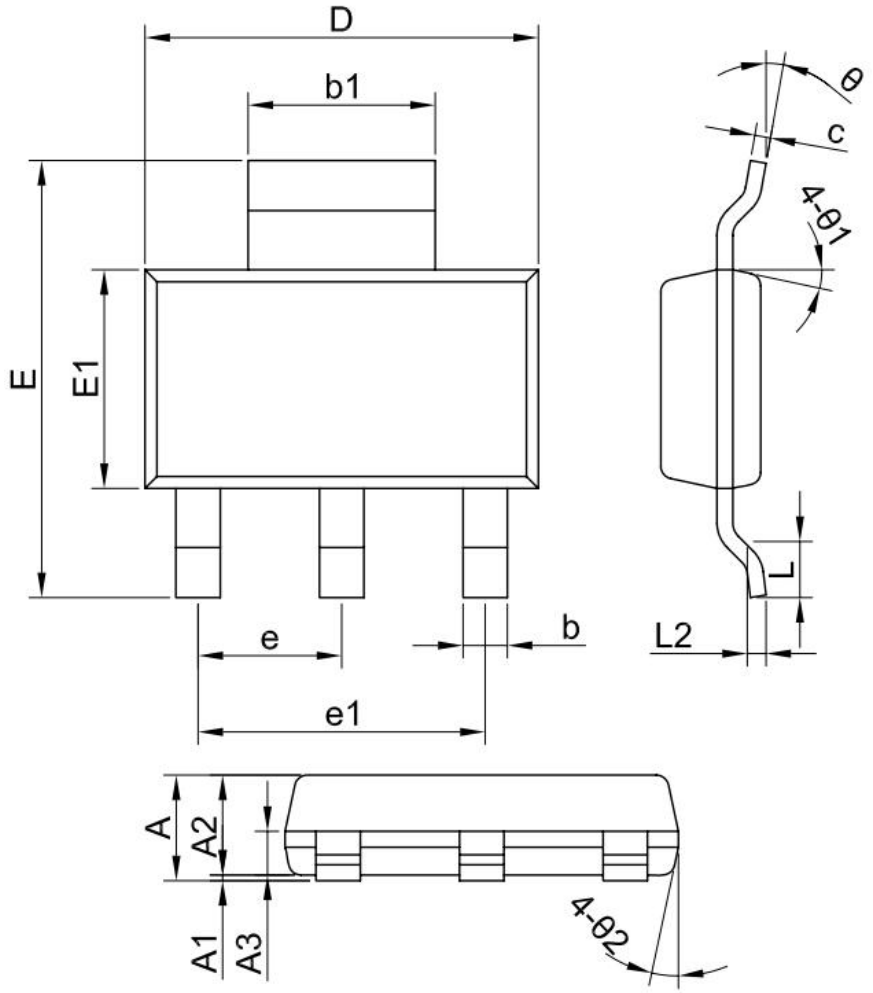


Figure 11 Normalized Maximum Transient Thermal Impedance

SOT-223-3L Package Information



SYMBOL	MIN	NOM	MAX
A	1.55	——	1.80
A1	0.02	——	0.12
A2	1.45	1.60	1.75
A3	0.60	0.70	0.80
b	0.60	——	0.80
b1	2.90	——	3.10
c	0.24	——	0.32
D	6.20	6.30	6.50
E	6.70	7.00	7.30
E1	3.30	3.50	3.70
e	2.299REF		
e1	4.598REF		
L	0.90MIN		
L2	0.30BSC		
θ	0°	——	10°
θ_1	10°	12°	14°
θ_2	10°	12°	14°

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