NCE P-Channel Enhancement Mode Power MOSFET

Description

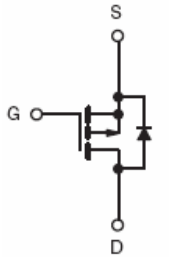
The NCE30P12S uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a load switch or in PWM applications.

General Features

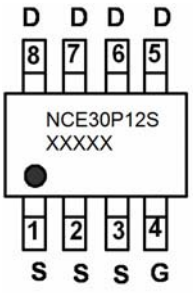
- V_{DS} = -30V,I_D = -12A
  $R_{DS(ON)}$ < 25mΩ @ V_{GS}=-4.5V
  $R_{DS(ON)}$ < 15mΩ @ V_{GS}=-10V
- High Power and current handing capability
- Lead free product is acquired
- Surface mount package

Application

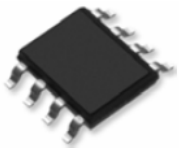
- PWM applications
- Load switch
- Power management



Schematic diagram



Marking and pin assignment



SOP-8 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE30P12S	NCE30P12S	SOP-8	Ø330mm	12mm	4000 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous (T_C=25℃)	I_D	-12	A
Drain Current-Continuous (T_C=100℃)		-8.4	
Drain Current-Pulsed (Note 1)	I_{DM}	-48	A
Maximum Power Dissipation (T_C=25℃)	P_D	3	W
Maximum Power Dissipation (T_C=100℃)		1.3	
Single pulse avalanche energy (Note 5)	E_{AS}	231	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	41.67	℃/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	-30	-33	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-30V,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	-1.5	-2.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-10A	-	11.5	15	mΩ
		V_{GS}=-4.5V, I_D=-7A	-	18	25	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-10V,I_D=-10A	-	20	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=-15V,V_{GS}=0V, F=1.0MHz	-	2419	-	PF
Output Capacitance	C_{oss}		-	318	-	PF
Reverse Transfer Capacitance	C_{rss}		-	262	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-15V, ID=-10A, V_{GS}=-10V,R_{GEN}=1Ω	-	9	-	nS
Turn-on Rise Time	t_r		-	8	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	28	-	nS
Turn-Off Fall Time	t_f		-	10	-	nS
Total Gate Charge	Q_g	V_{DS}=-15V,I_D=-10A,V_{GS}=-10V	-	44.4	-	nC
Gate-Source Charge	Q_{gs}		-	4.6	-	nC
Gate-Drain Charge	Q_{gd}		-	10	-	nC
Drain-Source Diode Characteristics						
Diode Forward Current (Note 2)	I_S		-	-	-12	A
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-12A	-	-	-1.2	V

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. E_{AS} condition: Tj=25℃,V_{DD}=-15V,V_G=10V,L=0.5mH,Rg=25Ω, I_{AS}=-34A

Typical Electrical and Thermal Characteristics

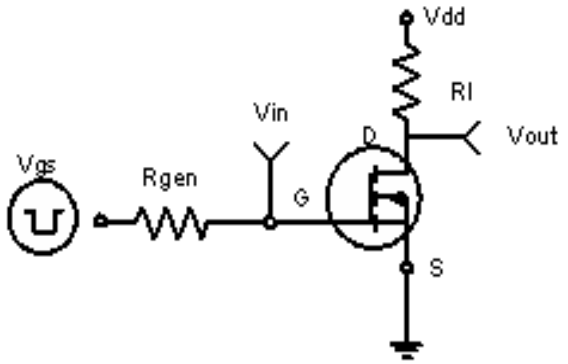


Figure 1:Switching Test Circuit

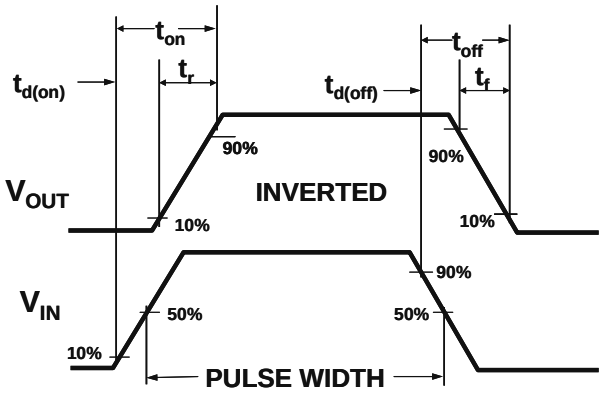
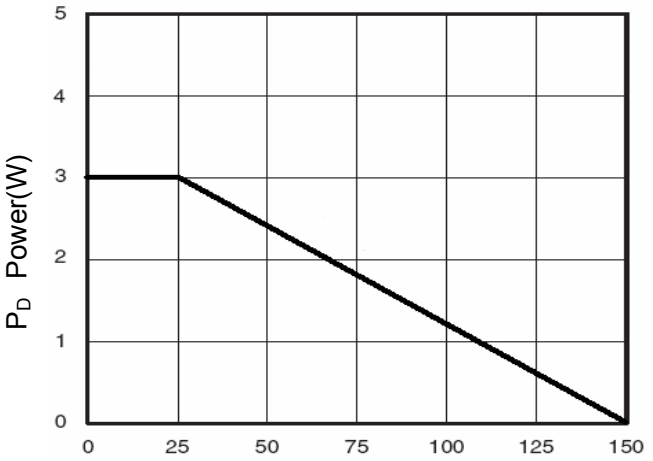
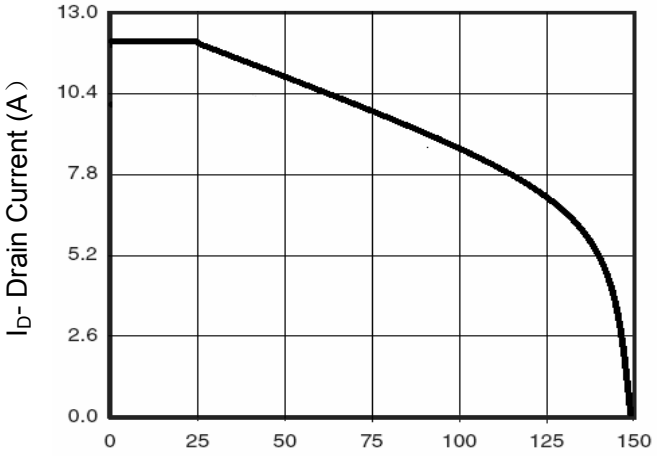


Figure 2:Switching Waveforms



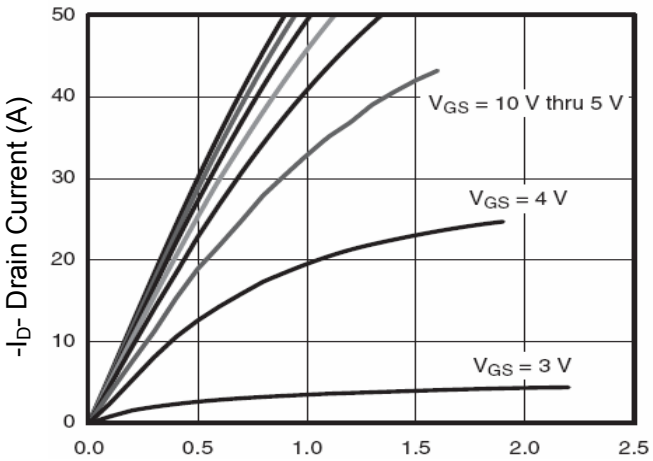
TJ-Junction Temperature(℃)

Figure 3 Power Dissipation



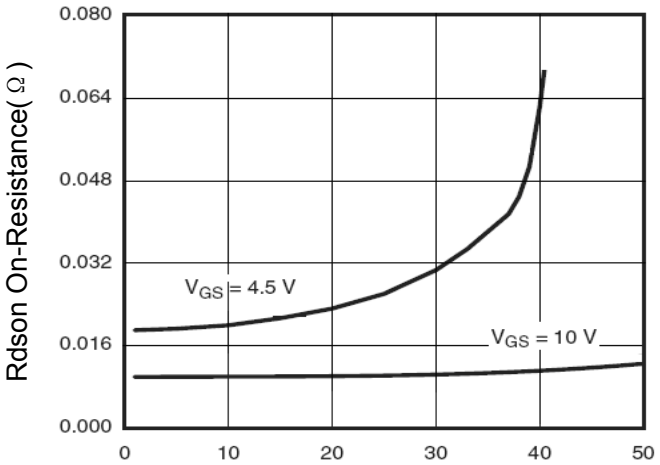
TJ-Junction Temperature(℃)

Figure 4 Drain Current



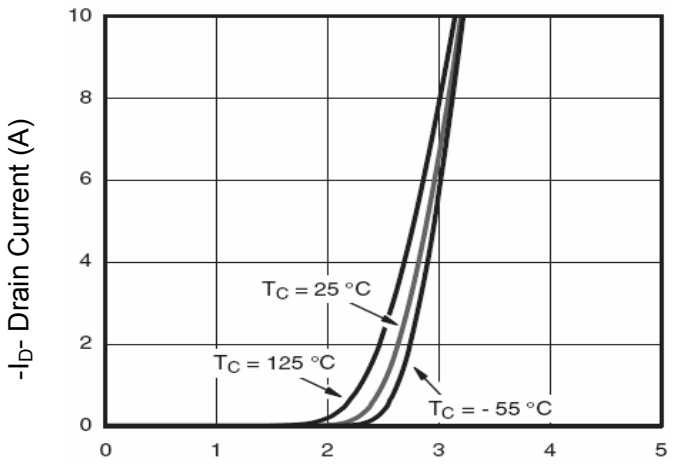
-Vds Drain-Source Voltage (V)

Figure 5 Output Characteristics



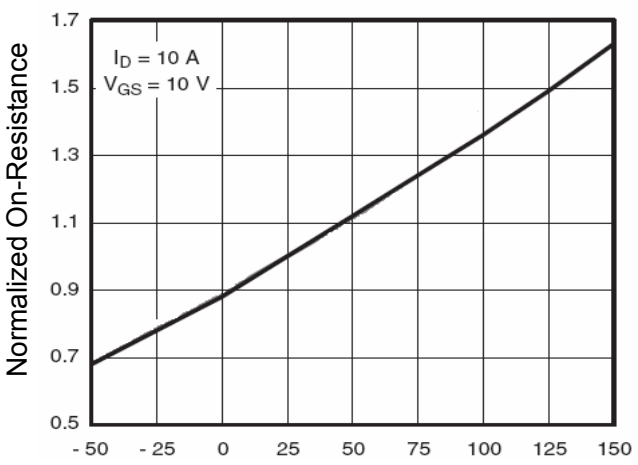
-ID- Drain Current (A)

Figure 6 Drain-Source On-Resistance



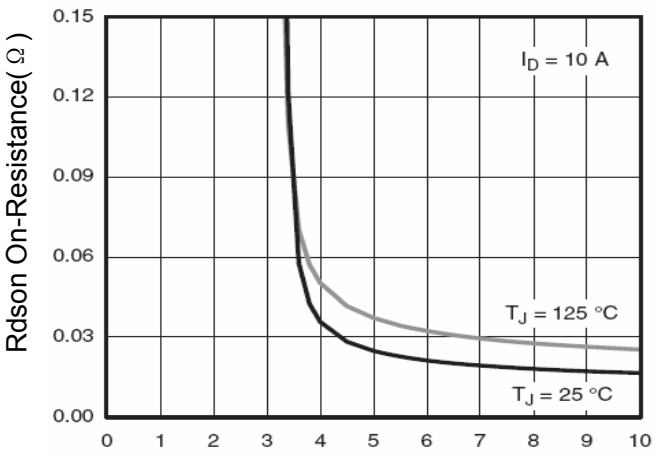
-Vgs Gate-Source Voltage (V)

Figure 7 Transfer Characteristics



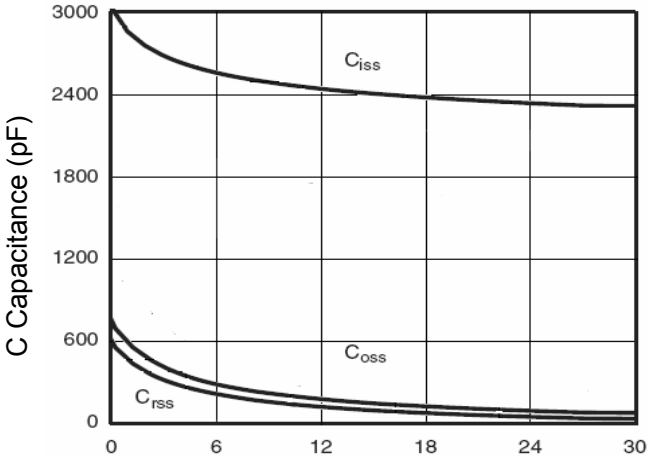
TJ-Junction Temperature(℃)

Figure 8 Drain-Source On-Resistance



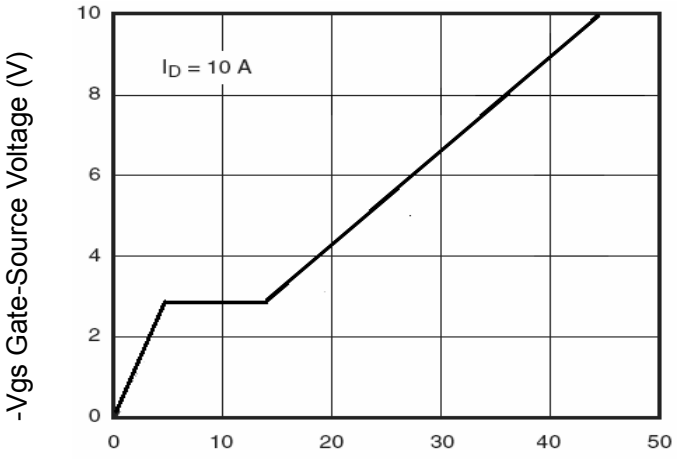
-Vgs Gate-Source Voltage (V)

Figure 9 Rdson vs Vgs



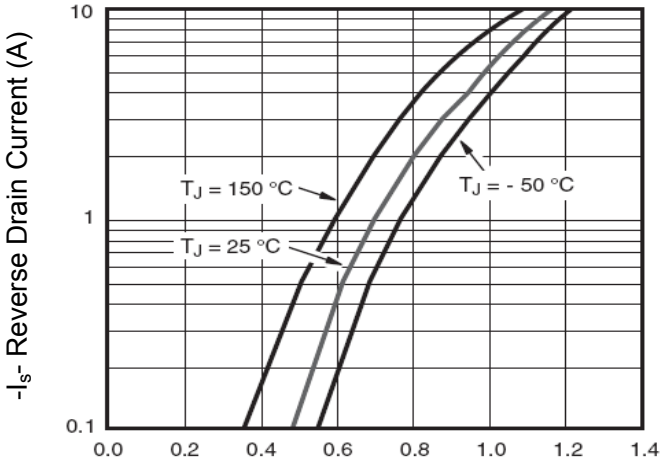
-Vds Drain-Source Voltage (V)

Figure 10 Capacitance vs Vds



Qg Gate Charge (nC)

Figure 11 Gate Charge



-Vsd Source-Drain Voltage (V)

Figure 12 Source- Drain Diode Forward

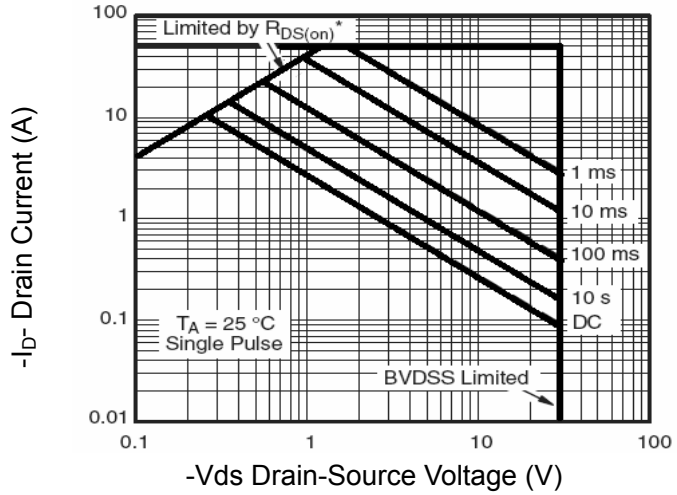


Figure 13 Safe Operation Area

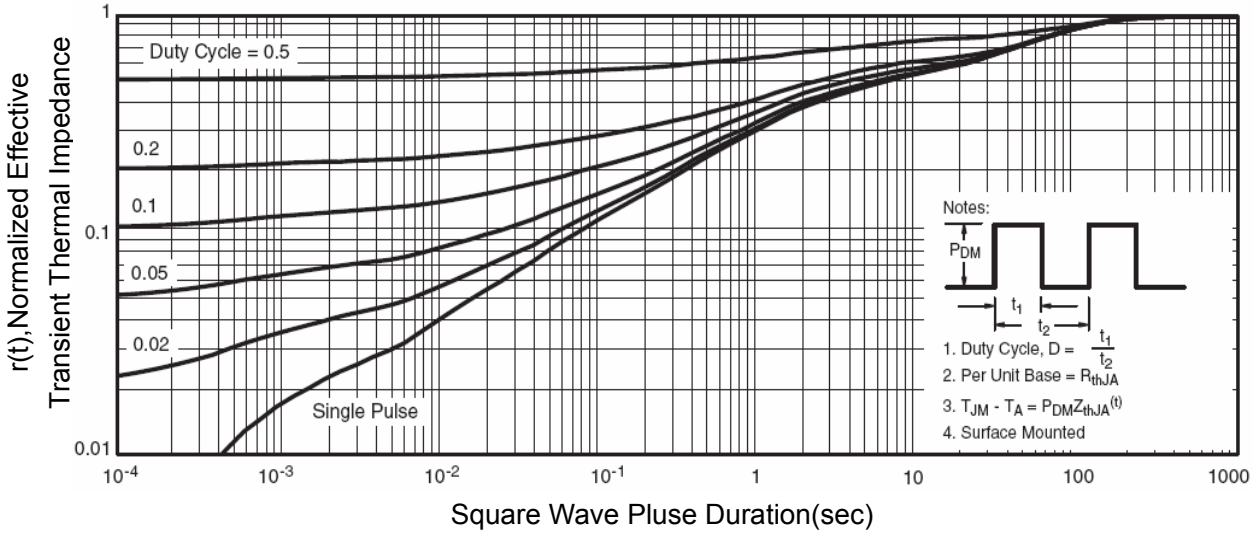
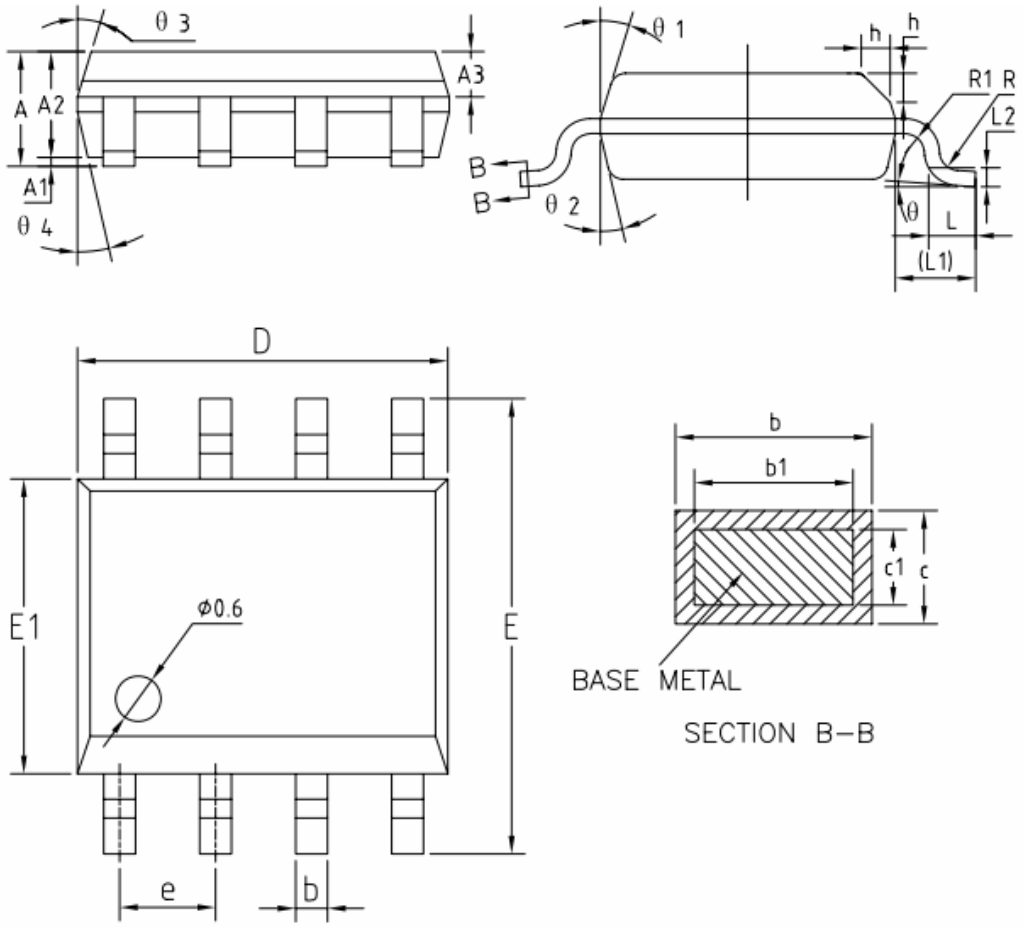


Figure 14 Normalized Maximum Transient Thermal Impedance

SOP-8 Package Information



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.15	0.25
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.38	–	0.51
b1	0.37	0.42	0.47
c	0.18	–	0.25
c1	0.17	0.20	0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.17	1.27	1.37
L	0.45	0.60	0.80
L1	1.04REF		
L2	0.25BSC		
R	0.07	–	–
R1	0.07	–	–
h	0.30	0.40	0.50
θ	0°	–	8°
θ 1	15°	17°	19°
θ 2	11°	13°	15°
θ 3	15°	17°	19°
θ 4	11°	13°	15°

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