

NCE P-Channel Enhancement Mode Power MOSFET

Description

The NCE55P15I 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

- $V_{DS} = -55V, I_D = -15A$
 $R_{DS(ON)} < 75m\Omega @ V_{GS} = -10V$

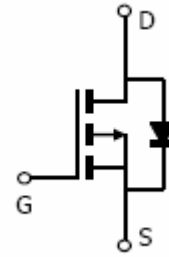
- High density cell design for ultra low $R_{ds(on)}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

- Power switching application
- Hard switched and high frequency circuits
- DC-DC Converter

100% UIS TESTED!

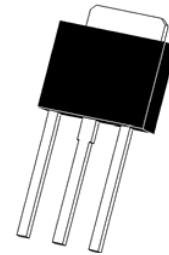
100% ΔV_{ds} TESTED!



Schematic diagram



Marking and pin assignment



TO-251 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE55P15I	NCE55P15I	TO-251	-	-	-

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-55	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-15	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	-10	A
Pulsed Drain Current	I_{DM}	-50	A
Maximum Power Dissipation	P_D	35	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

Thermal Resistance ,Junction-to-Case ^(Note 2)	$R_{\theta JC}$	4.3	$^{\circ}C/W$
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Electrical Characteristics ($T_C=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-55V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.5	-2.6	-3.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-5A$	-	60	75	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=-15V, I_D=-5A$	16	-	-	S
Dynamic Characteristics ^(Note4)						
Input Capacitance	C_{iss}	$V_{DS}=-20V, V_{GS}=0V,$ $F=1.0MHz$	-	1450	-	PF
Output Capacitance	C_{oss}		-	145	-	PF
Reverse Transfer Capacitance	C_{rss}		-	110	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-30V, R_L=30\Omega$ $V_{GS}=-10V, R_{GEN}=6\Omega$	-	8	-	nS
Turn-on Rise Time	t_r		-	9	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	65	-	nS
Turn-Off Fall Time	t_f		-	30	-	nS
Total Gate Charge	Q_g	$V_{DS}=-30V, I_D=-5A,$ $V_{GS}=-10V$	-	26	-	nC
Gate-Source Charge	Q_{gs}		-	4.5	-	nC
Gate-Drain Charge	Q_{gd}		-	7	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V_{SD}	$V_{GS}=0V, I_S=-15A$	-	-	1.2	V
Diode Forward Current ^(Note 2)	I_S		-	-	-15	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Test Circuit

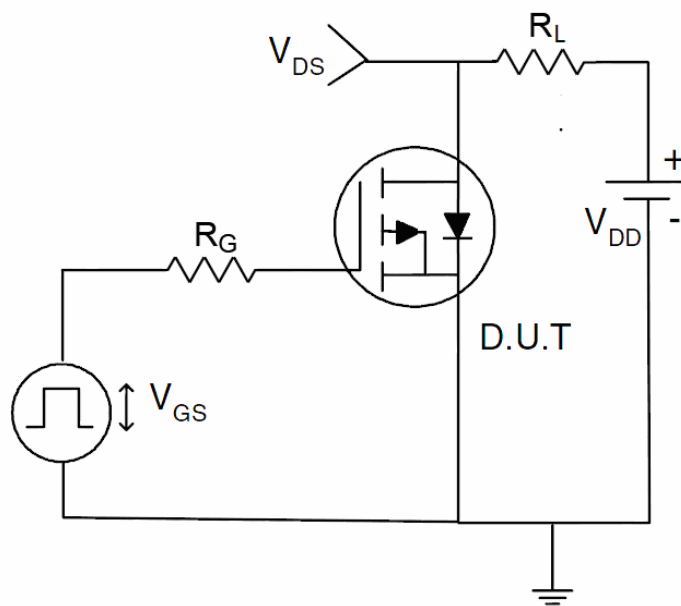
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

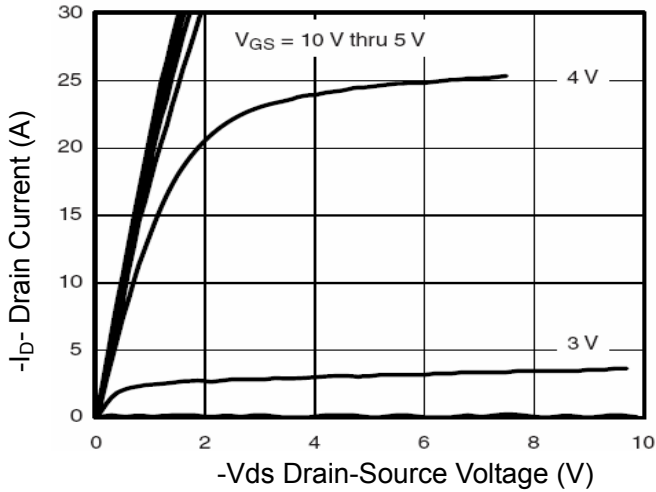


Figure 1 Output Characteristics

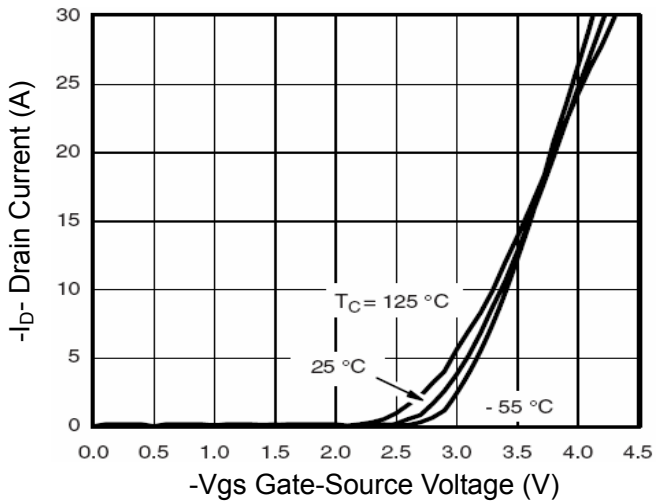


Figure 2 Transfer Characteristics

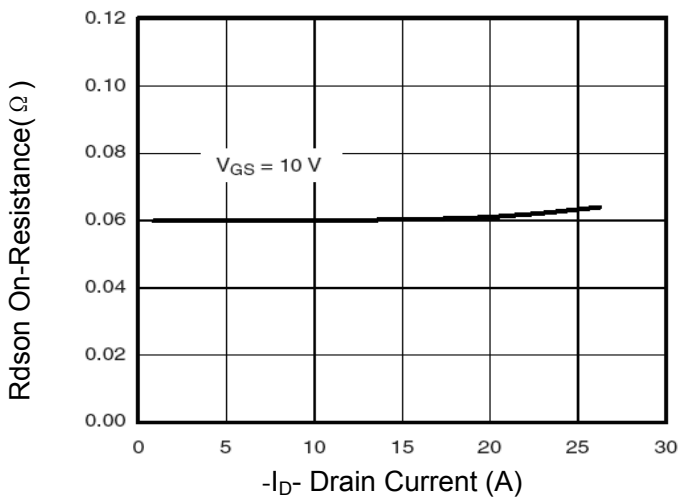


Figure 3 Rds(on)- Drain Current

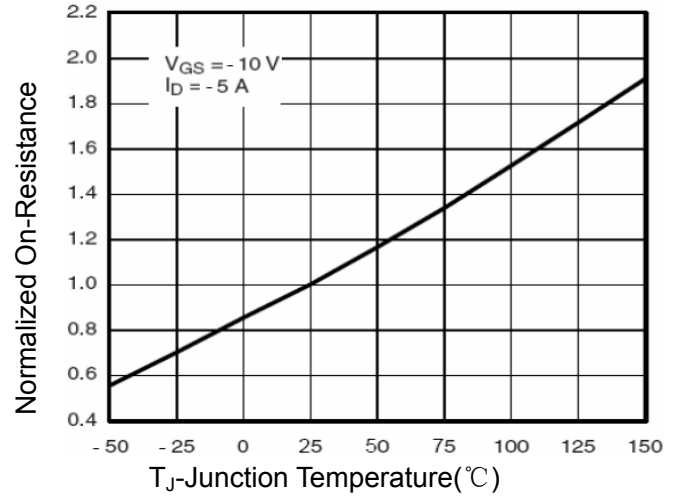


Figure 4 Rds(on)-Junction Temperature

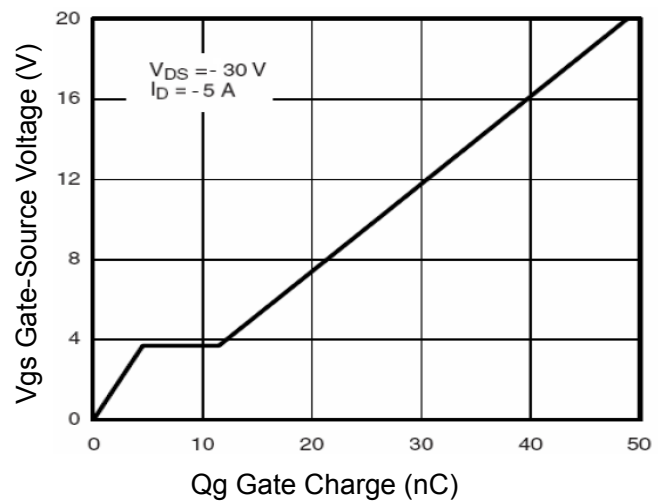


Figure 5 Gate Charge

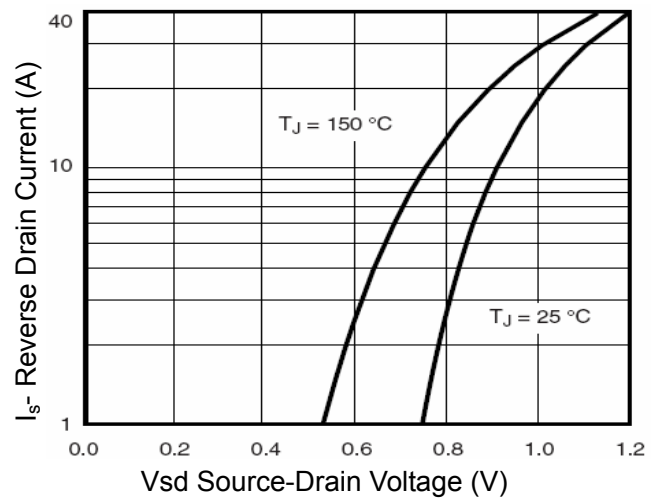


Figure 6 Source- Drain Diode Forward

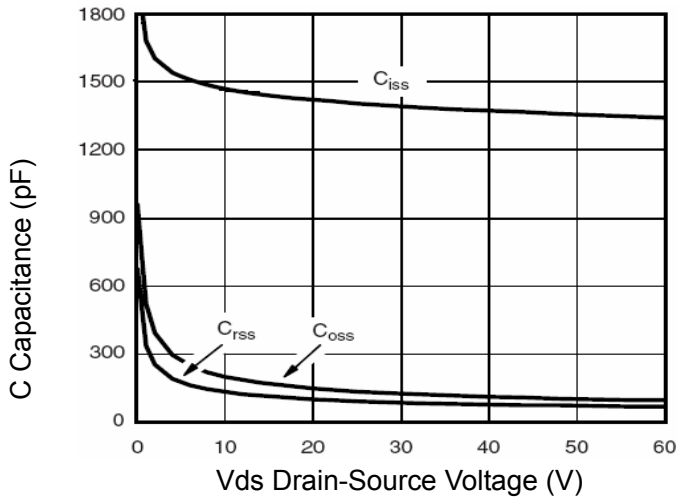


Figure 7 Capacitance vs Vds

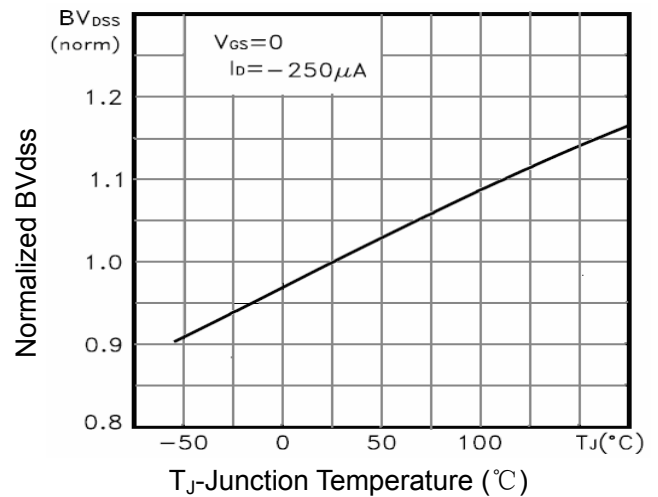


Figure 9 BV_{DSS} vs Junction Temperature

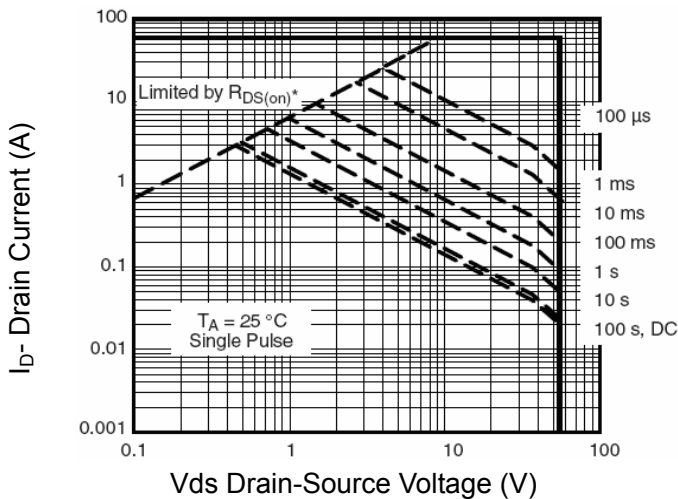


Figure 8 Safe Operation Area

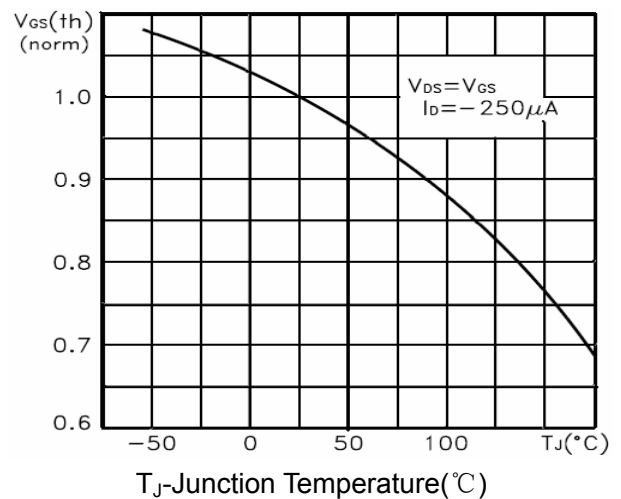


Figure 10 $V_{GS(th)}$ vs Junction Temperature

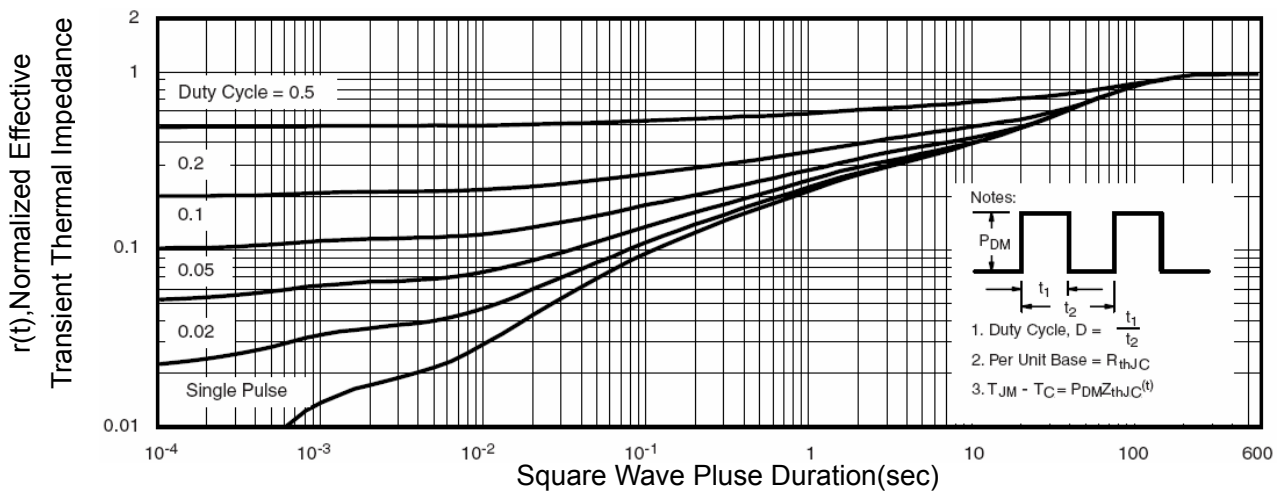
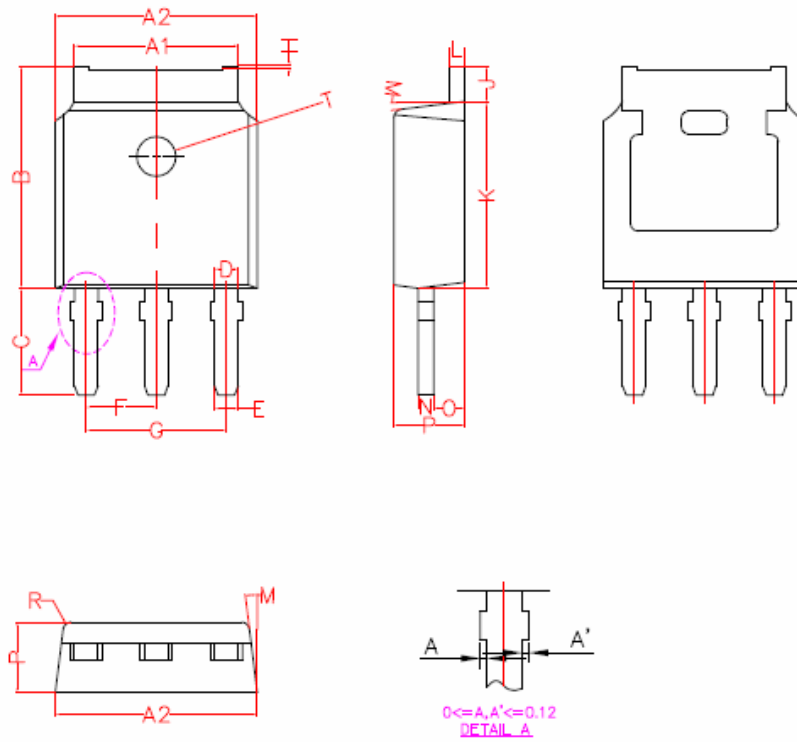


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-251 Package Information



Symbol	Min	Non	Max
A1	5.22	5.32	5.42
A2	6.55	6.60	6.65
B	7.05	7.10	7.15
C	4.80	5.00	5.20
D		1.00	
E		0.76	
F		2.286	
G		4.572	
H		0.15	
J	0.95	1.00	1.05
K	6.05	6.10	6.15
L		0.508	
M		7°	
N		0.508	
O	0.96	1.01	1.06
P	2.25	2.30	2.35
R		0.25	

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