NCE N-Channel Enhancement Mode Power MOSFET

Description

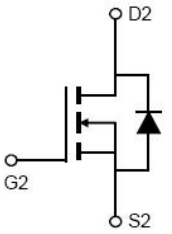
The NCE2013J uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages .This device is suitable for use as a load switching application and a wide variety of other applications.

General Features

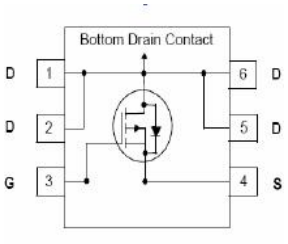
- V_{DS} = 20V,I_D = 13A
  $R_{DS(ON)}$ = 8.8mΩ @ V_{GS}=4.5V (Typ)
  $R_{DS(ON)}$ = 11.5mΩ @ V_{GS}=2.5V (Typ)
- Advanced trench MOSFET process technology
- Ultra low on-resistance with low gate charge

Application

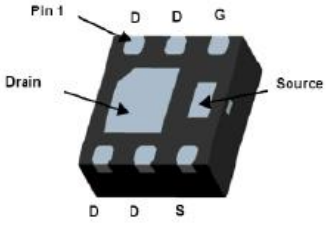
- PWM applications
- Load switch
- Battery charge in cellular handset



Schematic diagram



Pin assignment



DFN2X2-6L bottom view

Package marking and ordering information

Device Marking	Device	Device Package	Reel Size	Tape Width	Quantity
NCE2013J	NCE2013J	DFN2X2-6L	-	-	-

Absolute maximum ratings (T_A=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous	I_D	13	A
Drain Current -Pulsed (Note 1)	I_{DM}	50	A
Maximum Power Dissipation	P_D	2.8	W
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	℃/W

Electrical characteristics (T_A=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)\ DSS}$	V_{GS}=0V I_D=250μA	20	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V,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	0.4	0.7	1	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=10A	-	8.8	10.5	mΩ
		V_{GS}=2.5V, I_D=7A	-	11.5	15	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=10A	-	20	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=10V,V_{GS}=0V, F=1.0MHz	-	1544	-	PF
Output Capacitance	C_{oss}		-	210	-	PF
Reverse Transfer Capacitance	C_{rss}		-	201	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=10V,R_L=1Ω V_{GS}=4.5V,R_{GEN}=3Ω	-	3	-	nS
Turn-on Rise Time	t_r		-	10	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	35	-	nS
Turn-Off Fall Time	t_f		-	12	-	nS
Total Gate Charge	Q_g	V_{DS}=10V,I_D=10A, V_{GS}=4.5V	-	23.5	-	nC
Gate-Source Charge	Q_{gs}		-	2.8	-	nC
Gate-Drain Charge	Q_{gd}		-	5.75	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=10A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	13	A

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

Typical Electrical and Thermal Characteristics

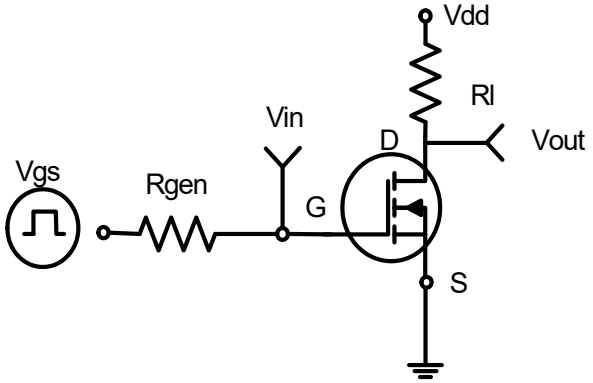


Figure 1:Switching Test Circuit

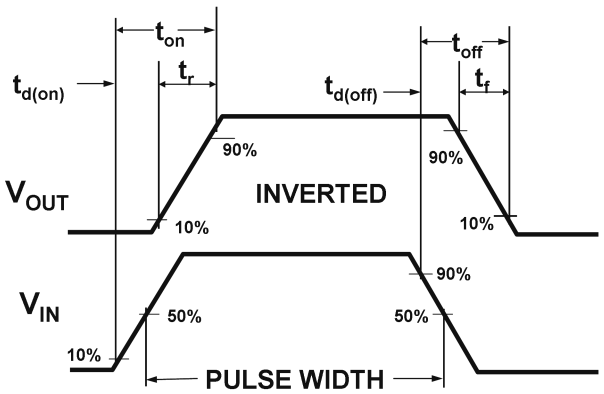


Figure 2:Switching Waveforms

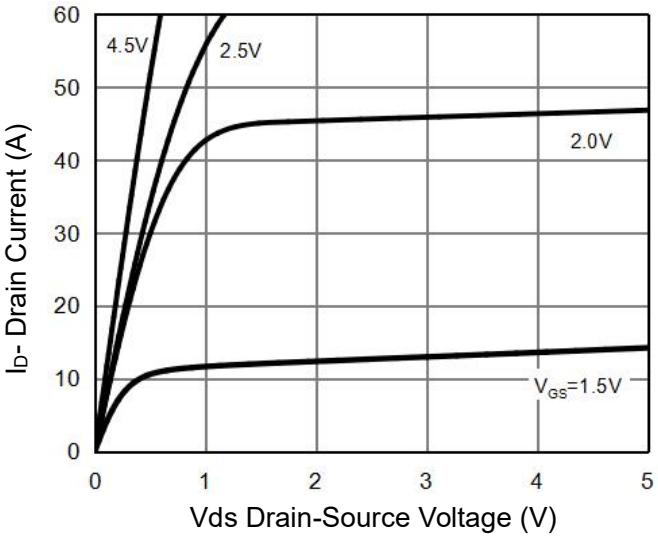


Figure 3 Output Characteristics

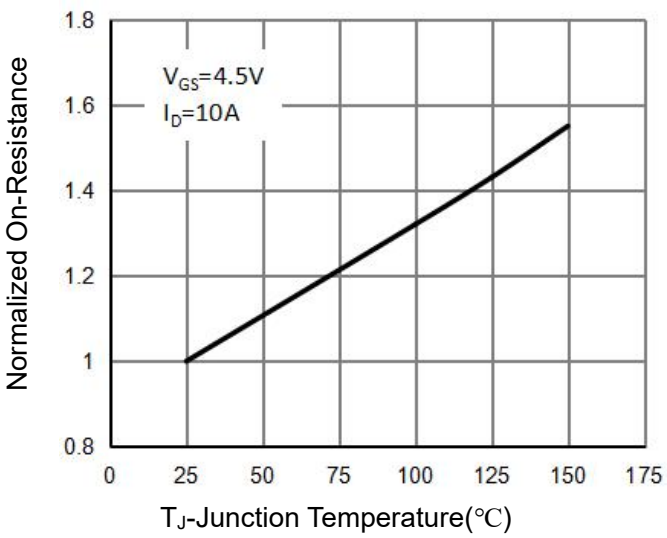


Figure 4 Rdson-JunctionTemperature

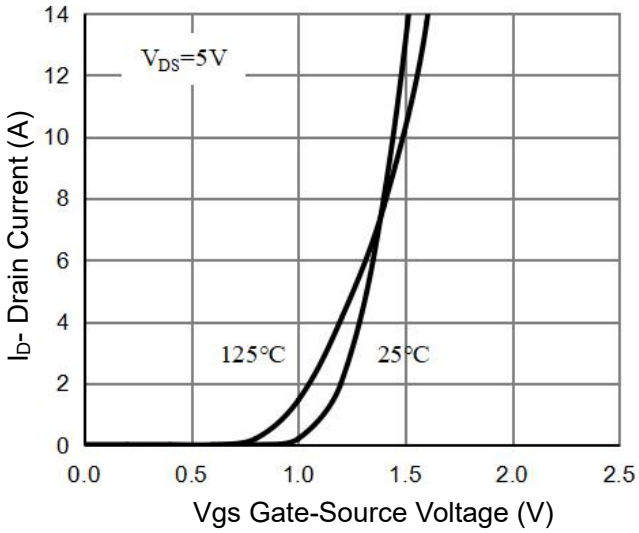


Figure 5 Transfer Characteristics

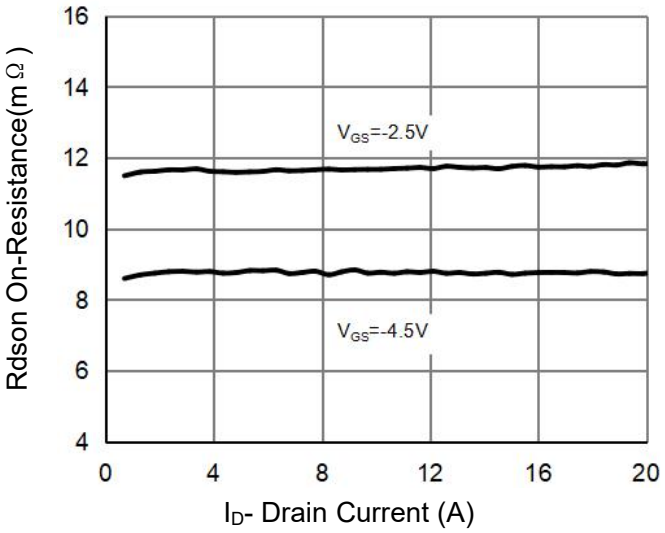


Figure 6 Rdson- Drain Current

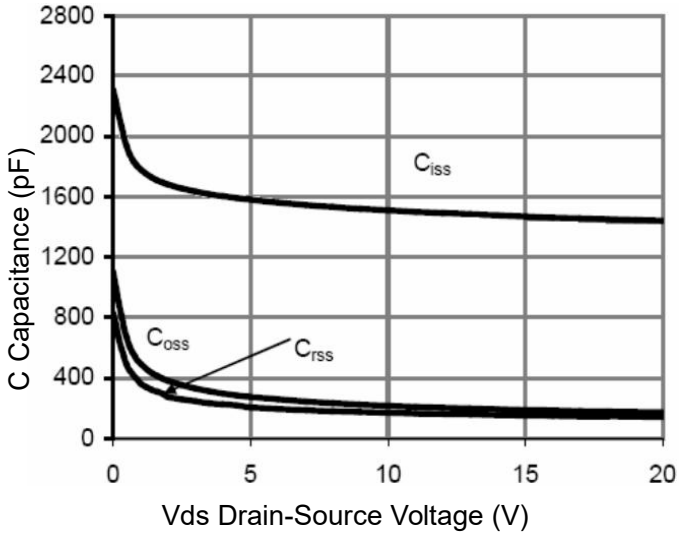


Figure 7 Capacitance vs Vds

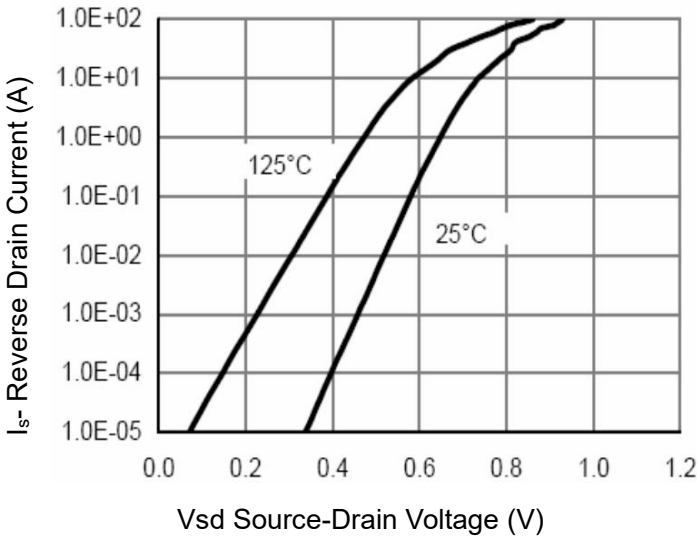


Figure 8 Source- Drain Diode Forward

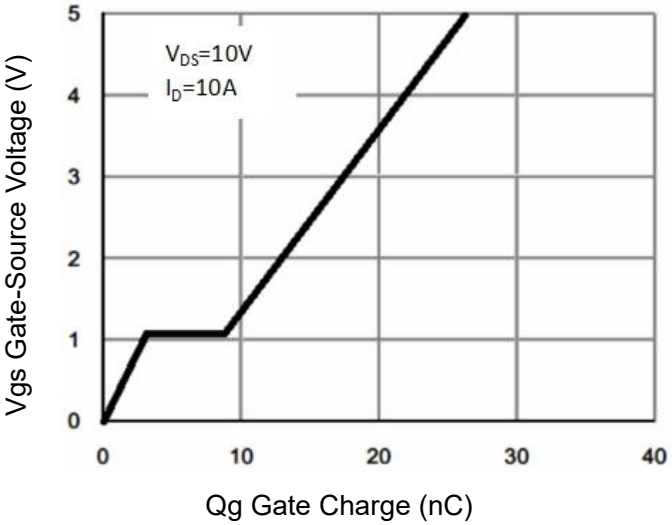


Figure 9 Gate Charge

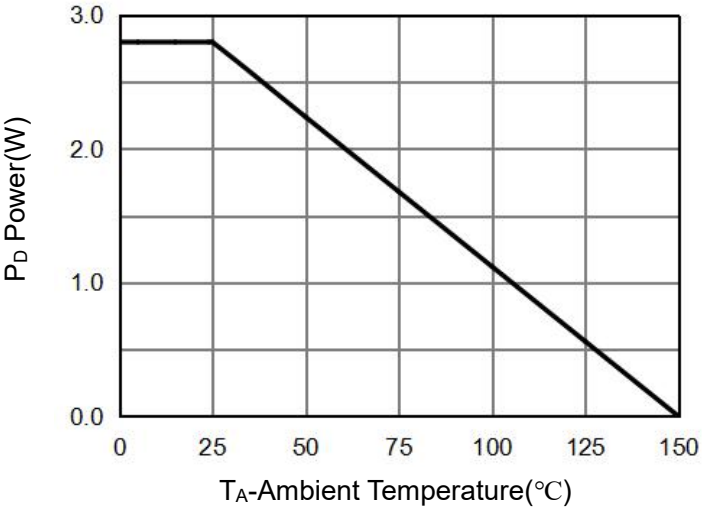


Figure 10 Power Dissipation

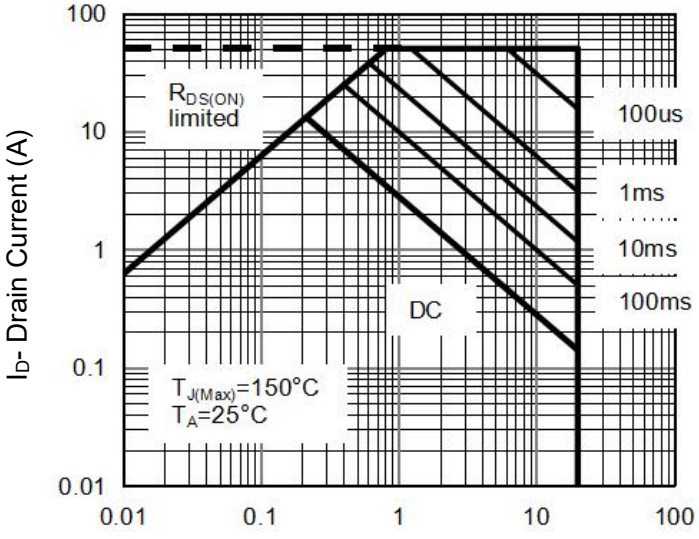


Figure 11 Safe Operation Area

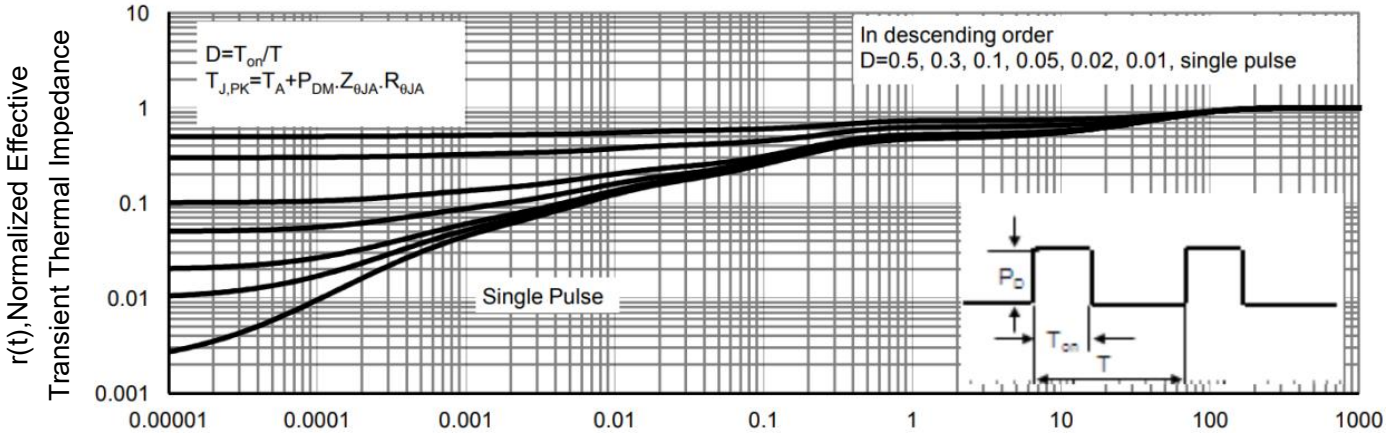
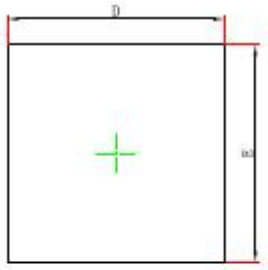
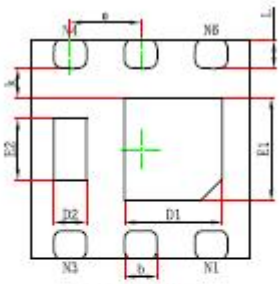


Figure 12 Normalized Maximum Transient Thermal Impedance

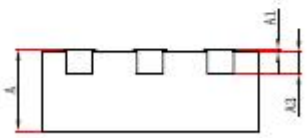
DFN2X2-6L Package Information



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	1.924	2.076	0.076	0.082
E	1.924	2.076	0.076	0.082
D1	0.800	1.000	0.031	0.039
E1	0.850	1.050	0.033	0.041
D2	0.200	0.400	0.008	0.016
E2	0.460	0.660	0.018	0.026
k	0.200MIN.		0.008MIN.	
b	0.250	0.350	0.010	0.014
e	0.650TYP.		0.026TYP.	
L	0.174	0.326	0.007	0.013

Notes

1. All dimensions are in millimeters.
2. Tolerance ±0.10mm (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

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