

NCE P-Channel Enhancement Mode Power MOSFET

Description

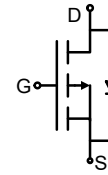
The NCE40P06J uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages. This device is suitable for use as a load switching application and a wide variety of other applications.

General Features

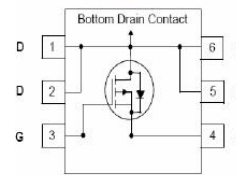
- $V_{DS} = -40V, I_D = -6A$
 $R_{DS(ON)} < 33m\Omega @ V_{GS} = -2.5V$
 $R_{DS(ON)} < 45m\Omega @ V_{GS} = -4.5V$
- Advanced trench MOSFET process technology
- Ultra low on-resistance with low gate charge

Application

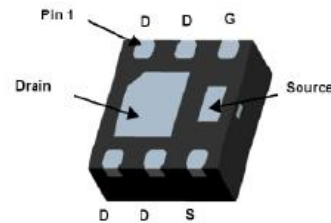
- PWM applications
- Load switch
- Battery charge in cellular handset



Schematic diagram



Pin assignment



DFN2X2-6L bottom view

Package marking and ordering information

Device Marking	Device	Device Package	Reel Size	Tape Width	Quantity
NCE40P06J	NCE40P06J	DFN2X2-6L	-	-	-

Absolute maximum ratings ($T_A = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V_{DS}	-40	V	
Gate-Source Voltage	V_{GS}	± 20	V	
Drain Current-Continuous	I_D	$T_A = 25^\circ C$	-6	A
Drain Current-Continuous		$T_C = 25^\circ C$	-15	A
Drain Current -Pulsed (Note 1)	I_{DM}	-38	A	
Maximum Power Dissipation	P_D	$T_A = 25^\circ C$	2.1	W
		$T_C = 25^\circ C$	12.3	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$	

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	59.5	$^\circ C/W$
Thermal Resistance, Junction-to-Case (Note 2)	$R_{\theta JC}$	10.2	$^\circ C/W$

Electrical characteristics (T_A=25°C 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	-40	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-40V, 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	-1.7	-2.1	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-6A	-	26	33	mΩ
		V _{GS} =-4.5V, I _D =-5A	-	34	45	mΩ
Gate resistance	R _G	V _{GS} =0V, V _{DS} =0V, F=1.0MHz	-	8.0	-	Ω
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-6A	-	5	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C _{ISS}	V _{DS} =-20V, V _{GS} =0V, F=1.0MHz	-	964	-	PF
Output Capacitance	C _{OSS}		-	109	-	PF
Reverse Transfer Capacitance	C _{RSS}		-	96	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-20V, I _D =-6A V _{GS} =-10V, R _{GEN} =10Ω	-	5.5	-	nS
Turn-on Rise Time	t _r		-	14	-	nS
Turn-Off Delay Time	t _{d(off)}		-	24	-	nS
Turn-Off Fall Time	t _f		-	12	-	nS
Total Gate Charge	Q _g	V _{DS} =-20V, I _D =-6A, V _{GS} =-10V	-	22.9	-	nC
Gate-Source Charge	Q _{gs}		-	3.5	-	nC
Gate-Drain Charge	Q _{gd}		-	5.3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-6A	-	-	-1.2	V
Diode Forward Current (Note 2)	I _S		-	-	-6	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1inch square copper plate.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

P- Channel Typical Electrical and Thermal Characteristics (Curves)

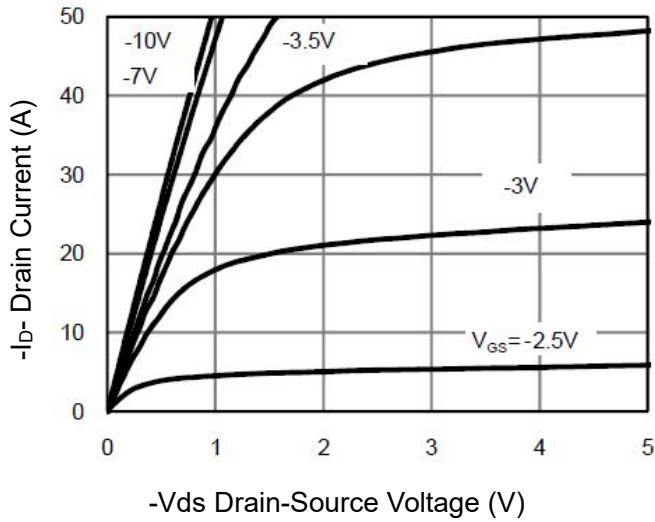


Figure 1 Output Characteristics

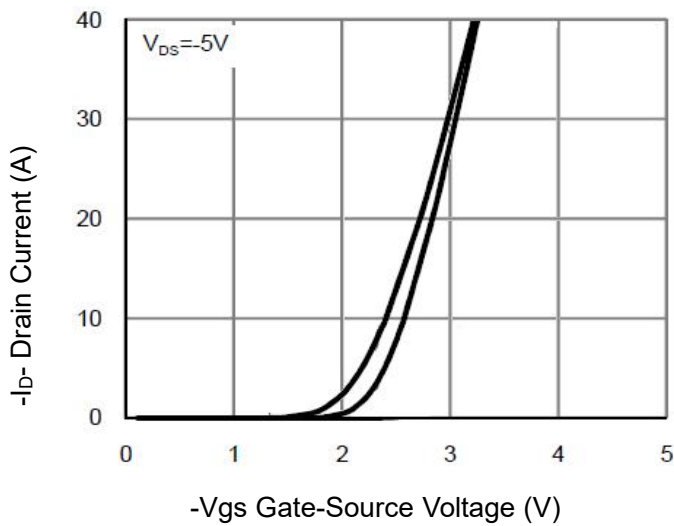


Figure 2 Transfer Characteristics

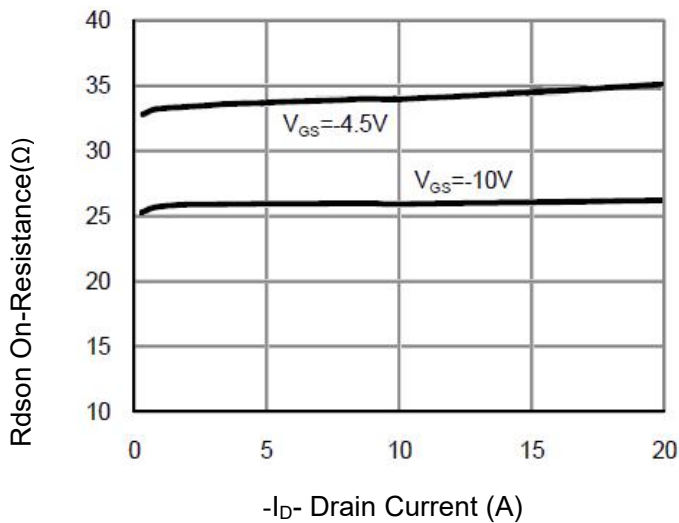


Figure 3 $R_{DS(on)}$ - Drain Current

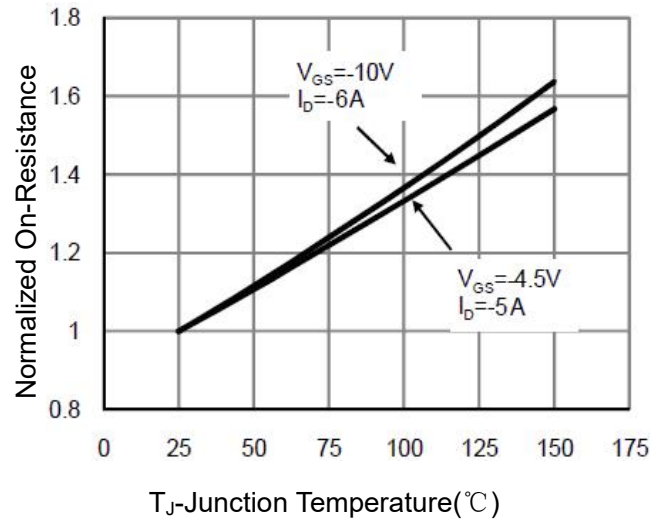


Figure 4 $R_{DS(on)}$ -Junction Temperature

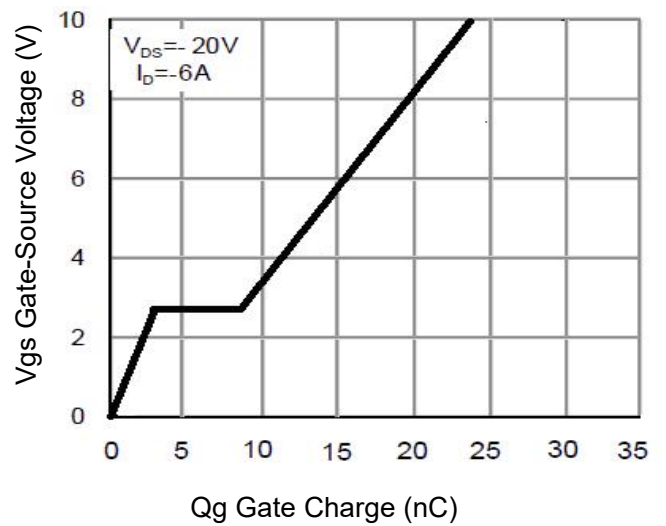


Figure 5 Gate Charge

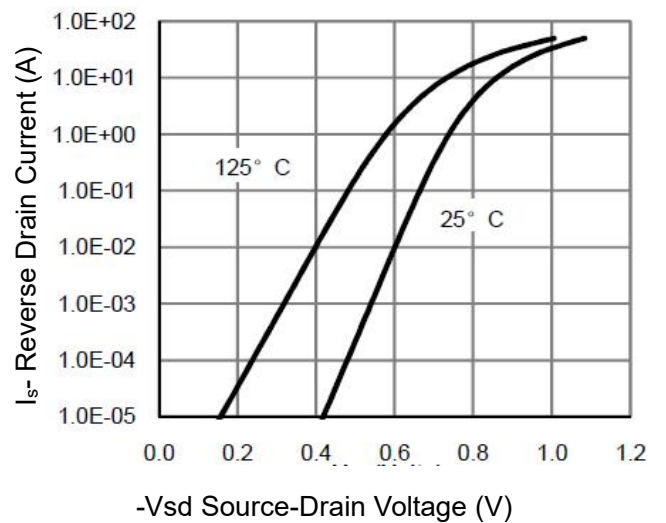
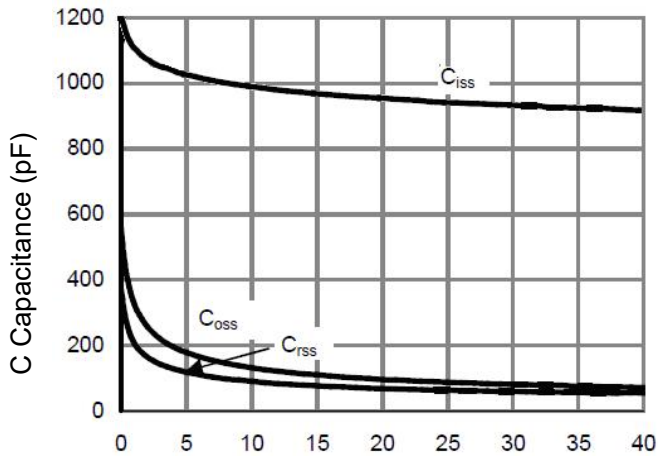
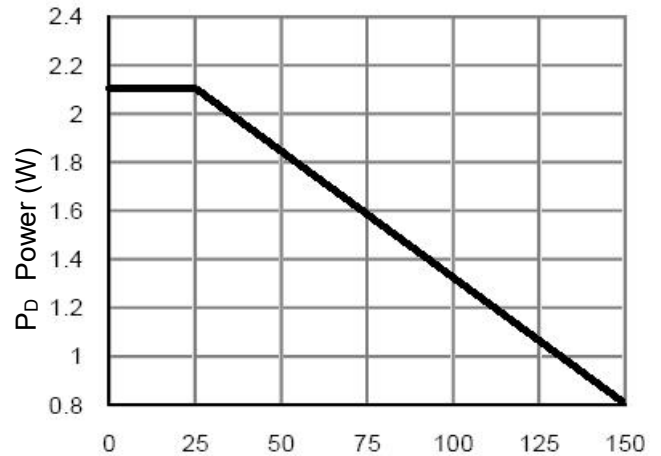


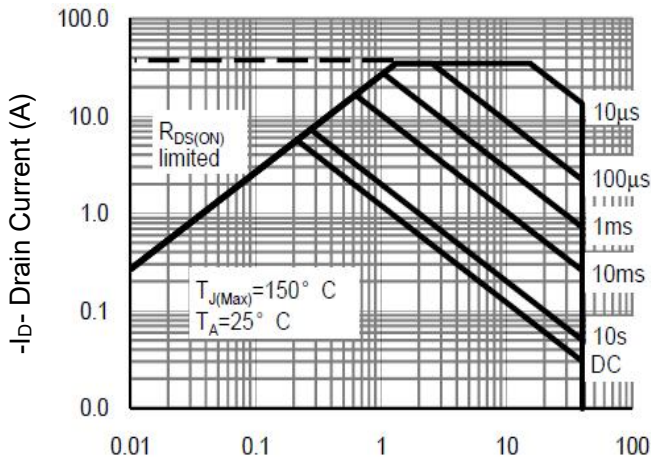
Figure 6 Source- Drain Diode Forward



-Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



TA-Ambient Temperature(°C)
Figure 9 Power Dissipation



-Vds Drain-Source Voltage (V)
Figure 8 Safe Operation Area

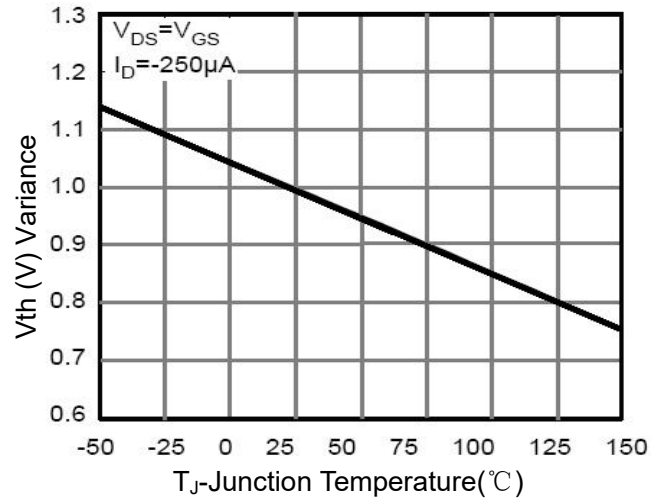


Figure 10 VGS(th) vs Junction Temperature

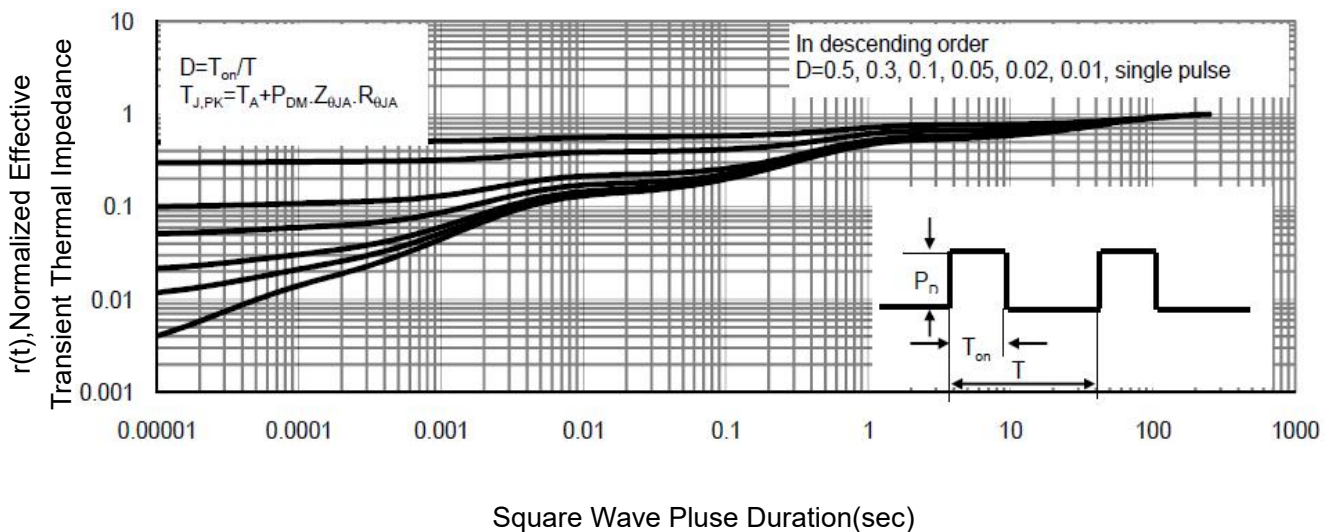
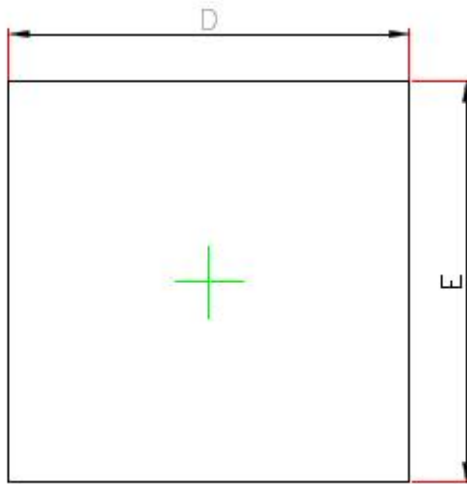
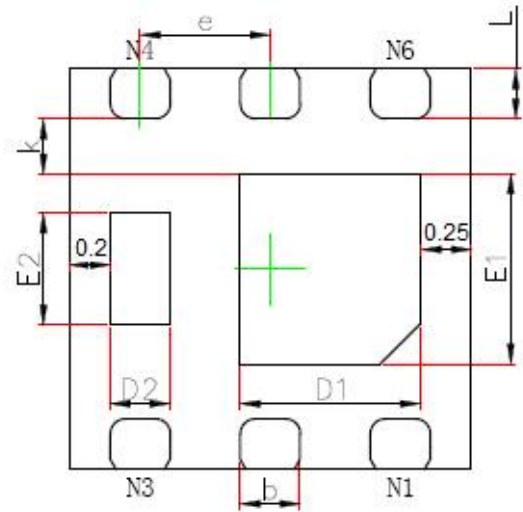


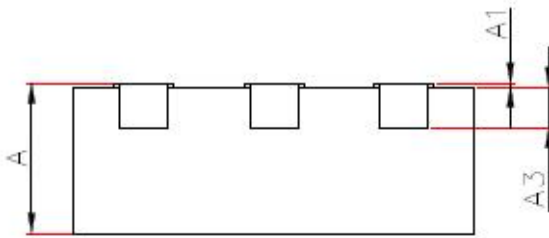
Figure 11 Normalized Maximum Transient Thermal Impedance

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	0.800/0.900	0.028/0.031	0.031/0.035
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

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