

NCE P-Channel Enhancement Mode Power MOSFET

Description

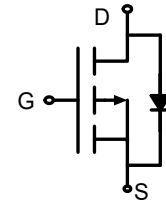
The NCE20P05J uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages. This device is suitable for use as a load switching application and a wide variety of other applications.

General Features

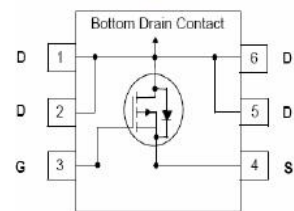
- $V_{DS} = -20V, I_D = -5A$
 $R_{DS(ON)} = 65m\Omega @ V_{GS} = -4.5V$ (Typ)
 $R_{DS(ON)} = 88m\Omega @ V_{GS} = -2.5V$ (Typ)
- Advanced trench MOSFET process technology
- Ultra low on-resistance with low gate charge

Application

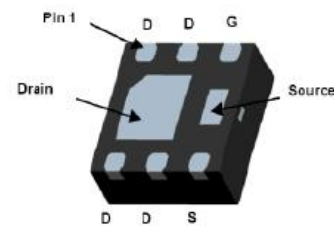
- PWM applications
- Load switch
- Battery charge in cellular handset



Schematic diagram



Pin assignment



DFN2X2-6L bottom view

Package marking and ordering information

Device Marking	Device	Device Package	Reel Size	Tape Width	Quantity
NCE20P05J	NCE20P05J	DFN2X2-6L	-	-	-

Absolute maximum ratings ($T_A = 25^\circ C$ 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	-5	A
Drain Current -Pulsed (Note 1)	I_{DM}	-20	A
Maximum Power Dissipation	P_D	2.5	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)	$R_{\theta JA}$	50	$^\circ C/W$
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Electrical characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR) DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-20	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-20V, V_{GS}=0V$	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.5	-0.7	-1	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-4.5V, I_D=-5A$	-	65	75	m Ω
		$V_{GS}=-2.5V, I_D=-2A$	-	88	115	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=-5V, I_D=-5A$	-	9	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{iss}	$V_{DS}=-10V, V_{GS}=0V,$ $F=1.0MHz$	-	496	-	PF
Output Capacitance	C_{oss}		-	140	-	PF
Reverse Transfer Capacitance	C_{rss}		-	86	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-10V, R_L=2\Omega$ $V_{GS}=-4.5V, R_{GEN}=3\Omega$	-	40	-	nS
Turn-on Rise Time	t_r		-	28	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	38	-	nS
Turn-Off Fall Time	t_f		-	10	-	nS
Total Gate Charge	Q_g	$V_{DS}=-10V, I_D=-1A,$ $V_{GS}=-4.5V$	-	7	-	nC
Gate-Source Charge	Q_{gs}		-	1.0	-	nC
Gate-Drain Charge	Q_{gd}		-	1.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=-5A$	-	-	-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-5	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

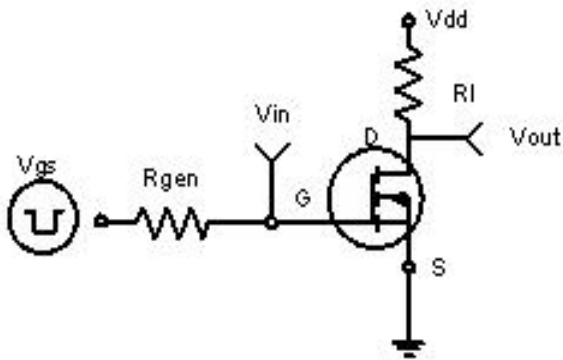


Figure 1: Switching Test Circuit

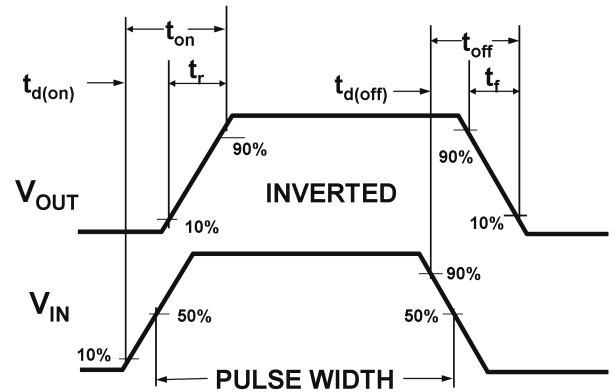


Figure 2: Switching Waveforms

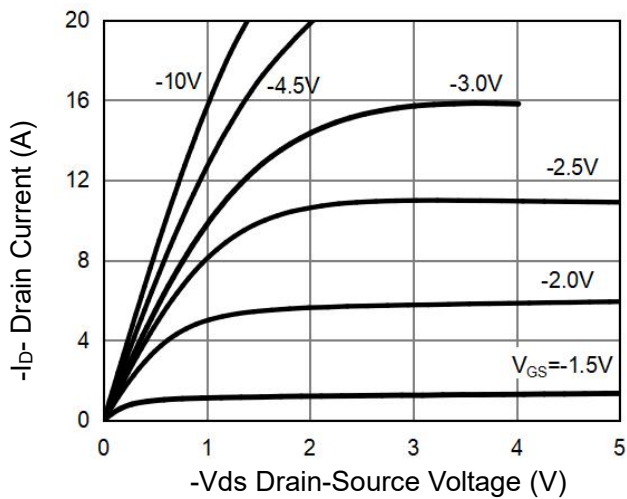


Figure 3 Output Characteristics

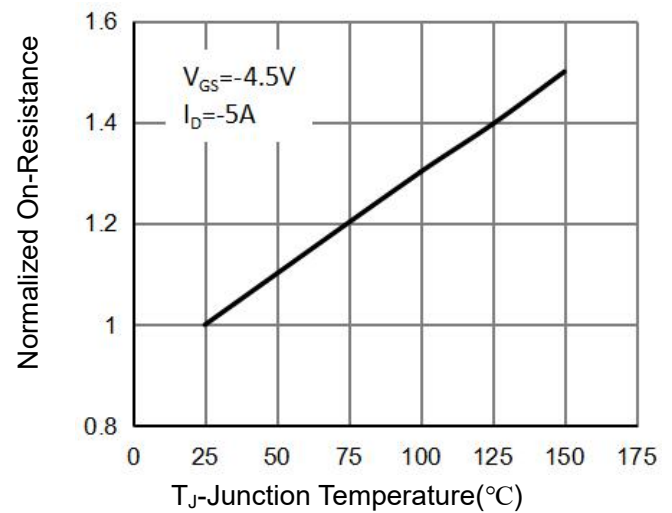


Figure 4 Rdson-Junction Temperature

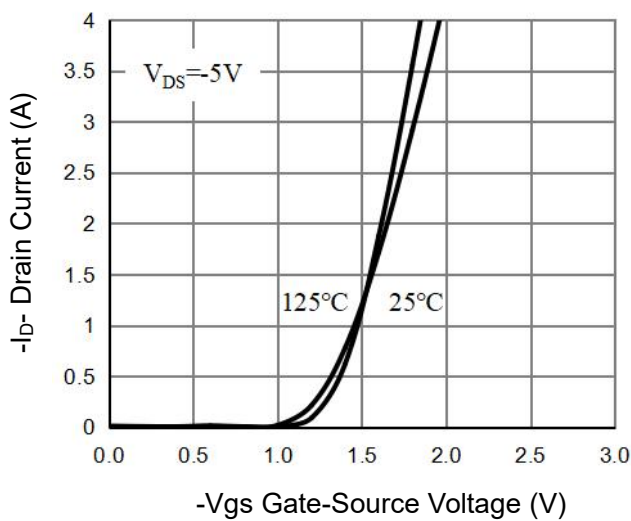


Figure 5 Transfer Characteristics

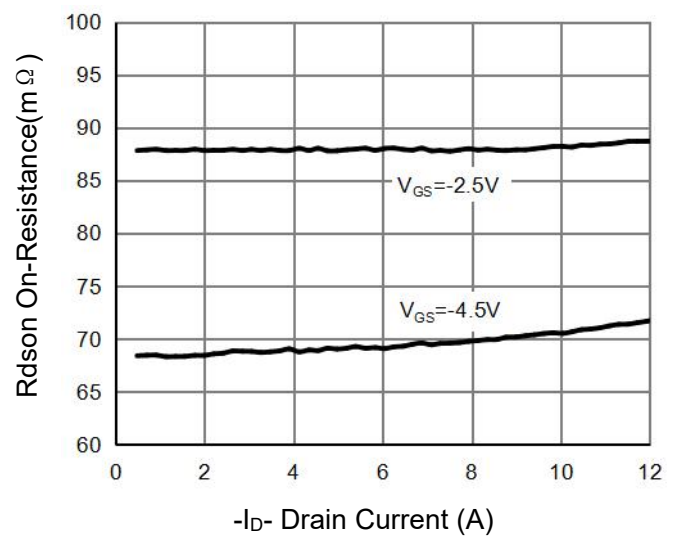


Figure 6 Rdson- Drain Current

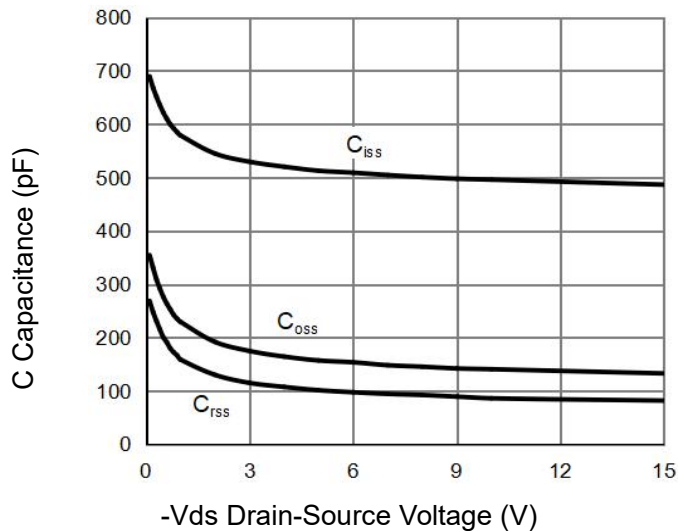


Figure 7 Capacitance vs Vds

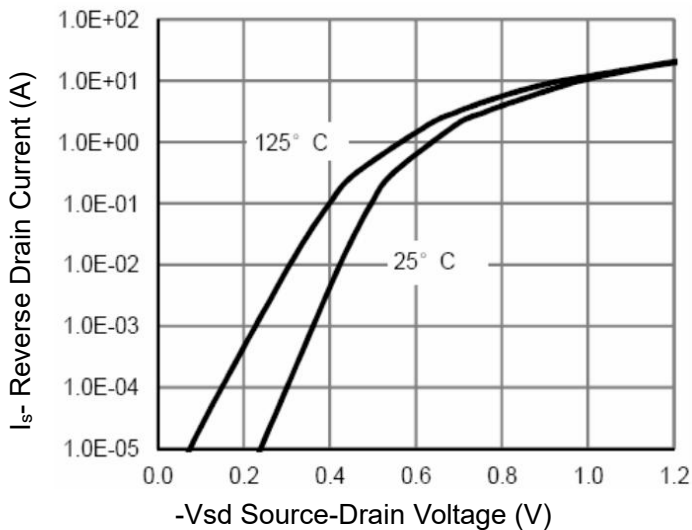


Figure 8 Source- Drain Diode Forward

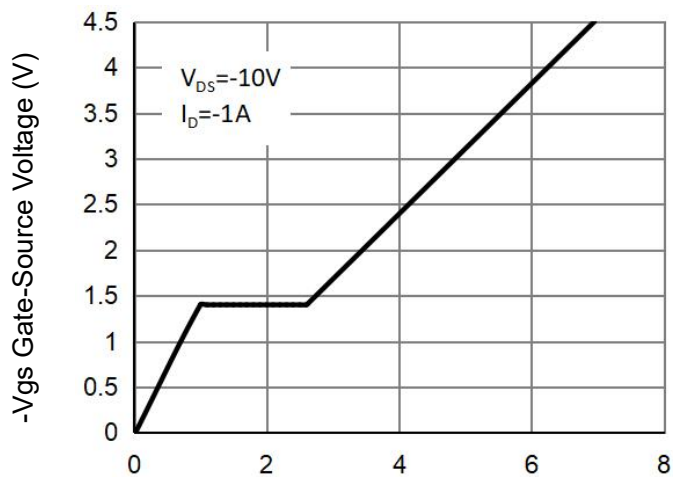


Figure 9 Gate Charge

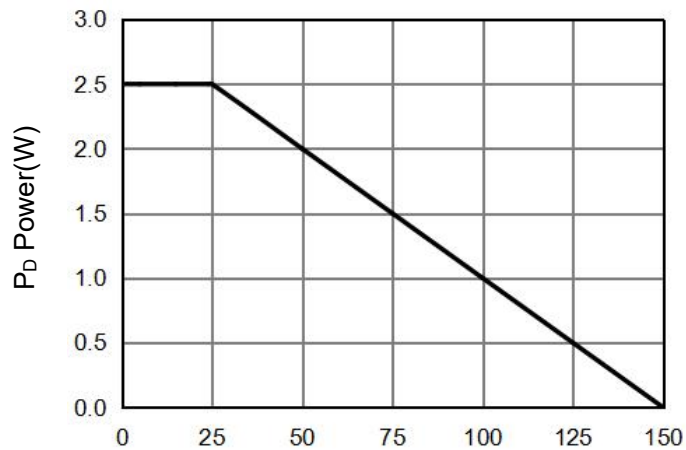


Figure 10 Power Dissipation

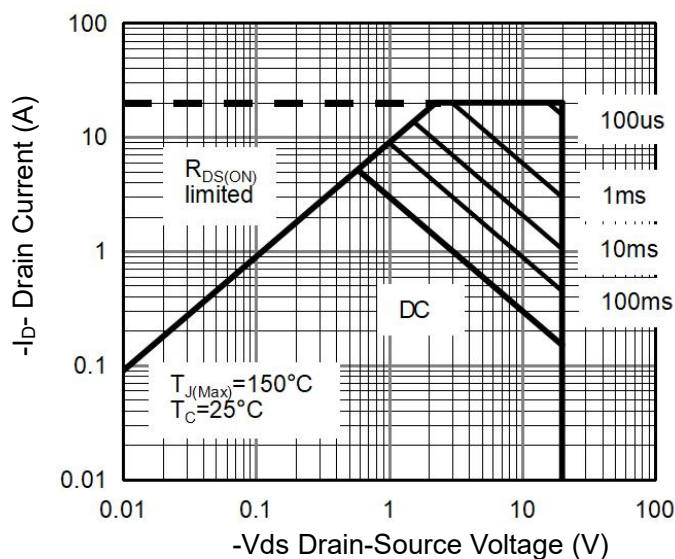


Figure 11 Safe Operation Area

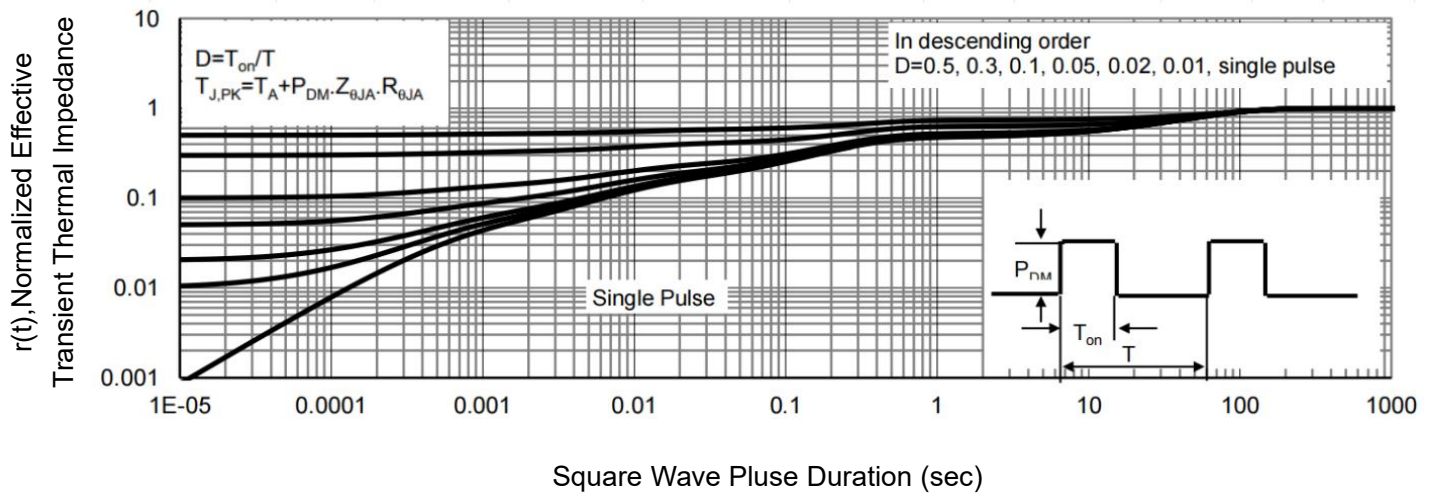
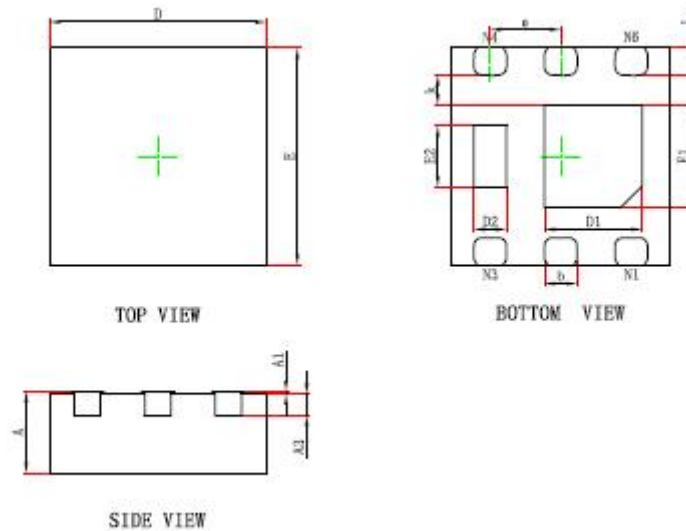


Figure 12 Normalized Maximum Transient Thermal Impedance

DFN2X2-6L Package Information


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 $\pm 0.10\text{mm}$ (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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