NCE N-Channel Enhancement Mode Power MOSFET

Description

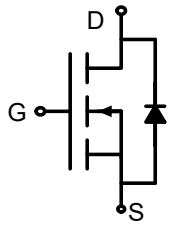
The NCE4005 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. This device is suitable for use as a Battery protection or in other switching application.

General Features

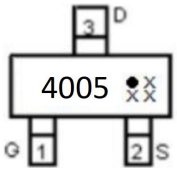
- V_{DS} =40V,I_D =5A
  $R_{DS(ON)}$ = 22mΩ @ V_{GS}=10V(Typ)
  $R_{DS(ON)}$ = 36mΩ @ V_{GS}=4.5V(Typ)
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

Application

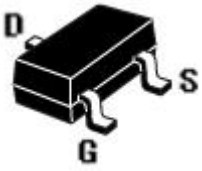
- Battery switch
- DC/DC converter



Schematic Diagram



Marking and Pin Assignment



SOT-23 Top View

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
4005 ●XX	NCE4005	SOT-23	Ø180mm	8 mm	3000 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	VDS	40	V
Gate-Source Voltage	VGS	±20	V
Drain Current-Continuous	I_D	5	A
Drain Current-Pulsed (Note 1)	I_{DM}	20	A
Single pulse avalanche energy (Note 5)	E_{AS}	42	mJ
Maximum Power Dissipation	P_D	1	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	125	℃/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	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	1.0	1.6	2.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=5A	-	22	26	mΩ
		V_{GS}=4.5V, I_D=3A	-	36	46	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=5A	-	9	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=20V,V_{GS}=0V, F=1.0MHz	-	530	-	PF
Output Capacitance	C_{oss}		-	68	-	PF
Reverse Transfer Capacitance	C_{rss}		-	58	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=20V,I_D=5A V_{GS}=10V,R_{GEN}=1Ω	-	10	-	nS
Turn-on Rise Time	t_r		-	8	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	25	-	nS
Turn-Off Fall Time	t_f		-	10	-	nS
Total Gate Charge	Q_g	V_{DS}=20V,I_D=5A, V_{GS}=10V	-	15.5	-	nC
Gate-Source Charge	Q_{gs}		-	2.9	-	nC
Gate-Drain Charge	Q_{gd}		-	3.5	-	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
5. EAS condition : Tj=25℃,V_{DD}=20V,V_G=10V,L=0.5mH,Rg=25Ω

Typical Electrical and Thermal Characteristics

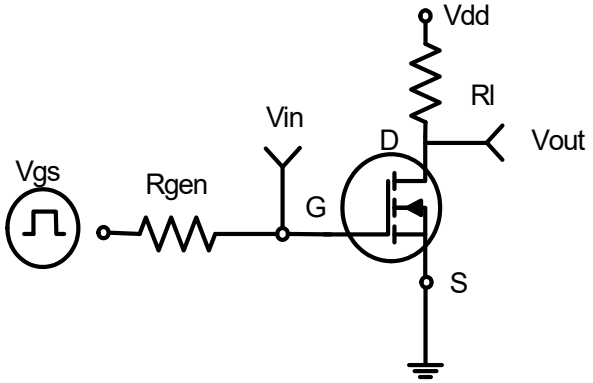


Figure 1:Switching Test Circuit

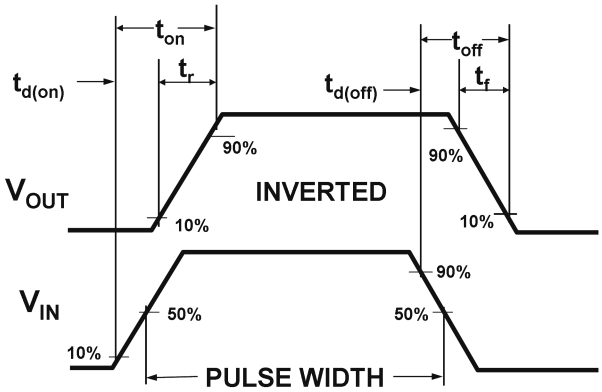


Figure 2:Switching Waveforms

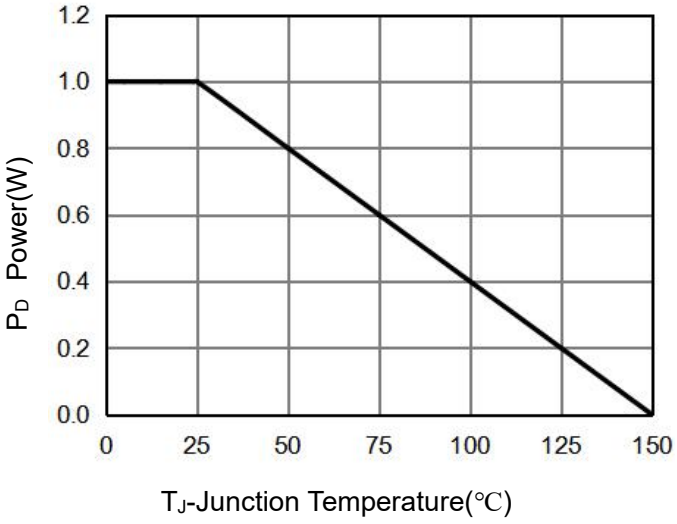


Figure 3 Power Dissipation

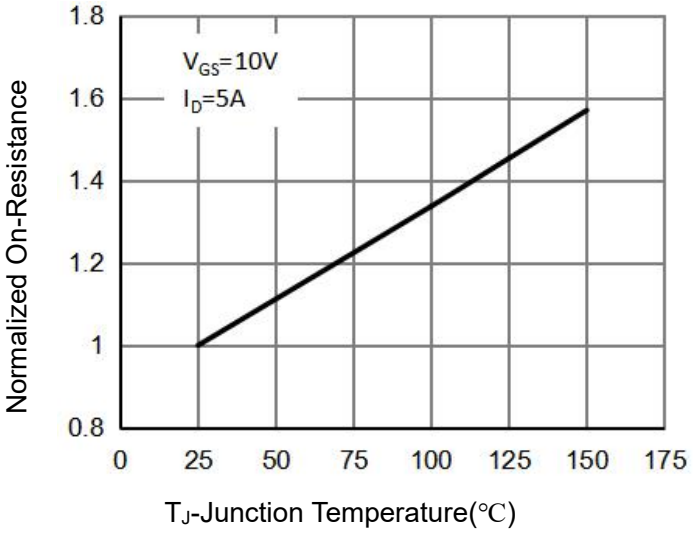


Figure 4 Drain-Source On-Resistance

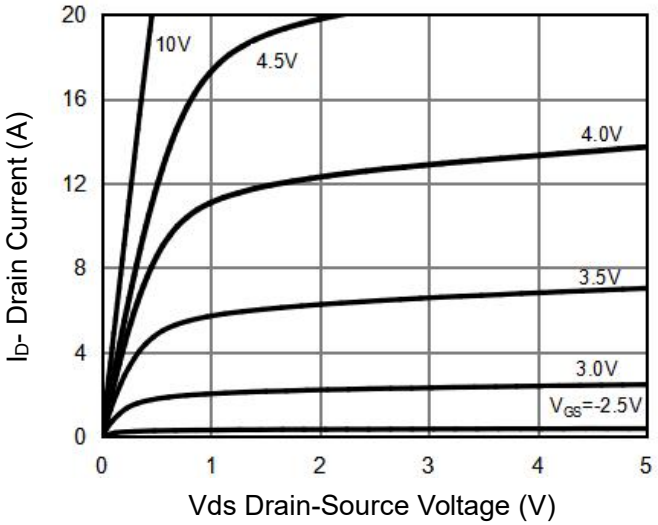


Figure 5 Output Characteristics

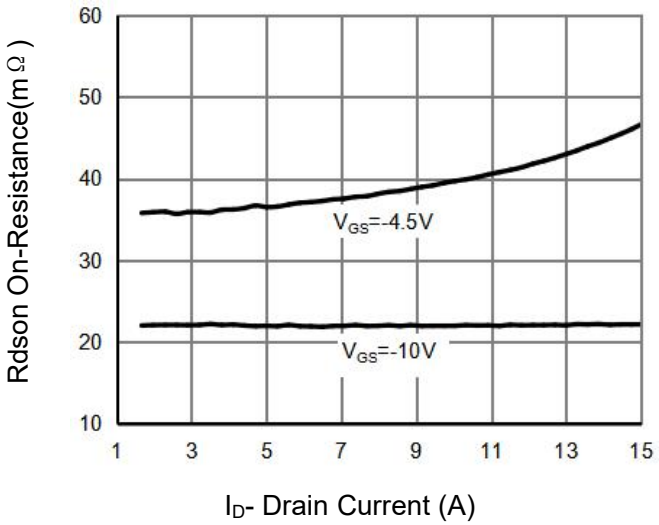


Figure 6 Drain-Source On-Resistance

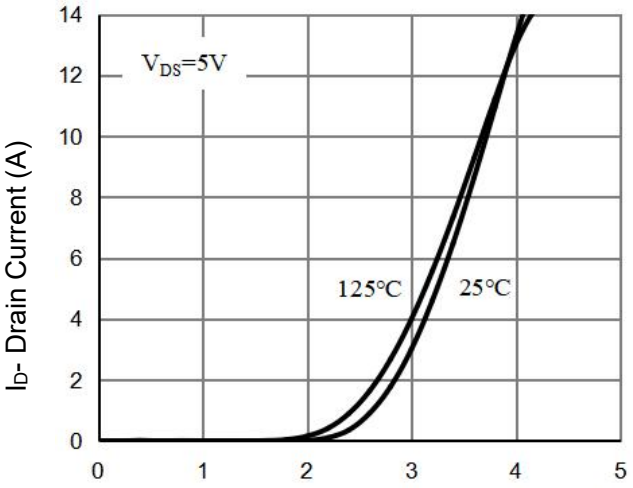


Figure 7 Transfer Characteristics

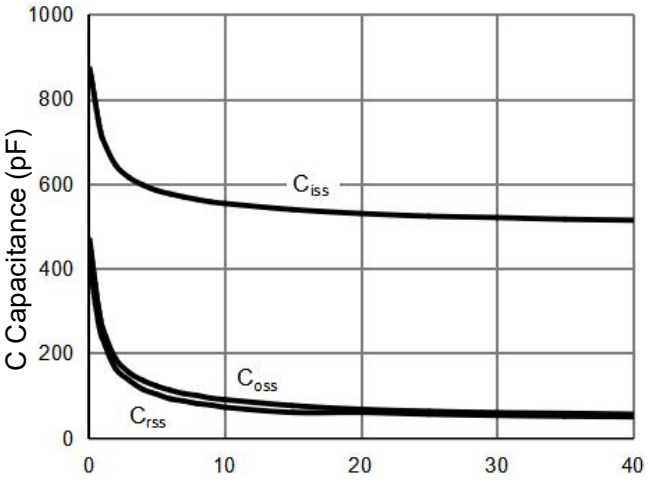


Figure 10 Capacitance vs Vds

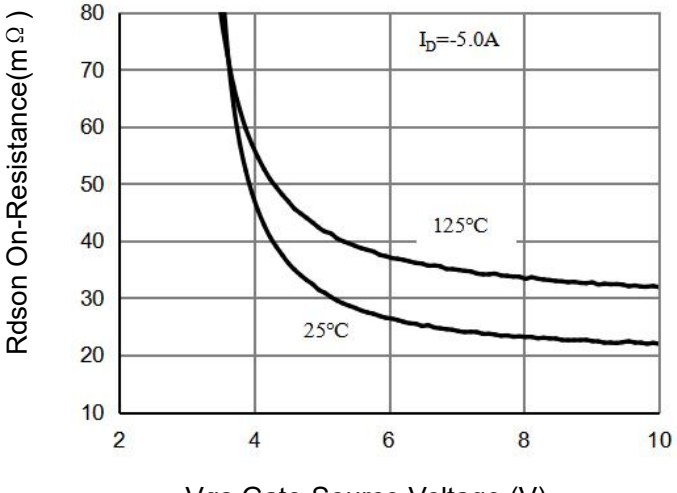


Figure 9 Rdson vs Vgs

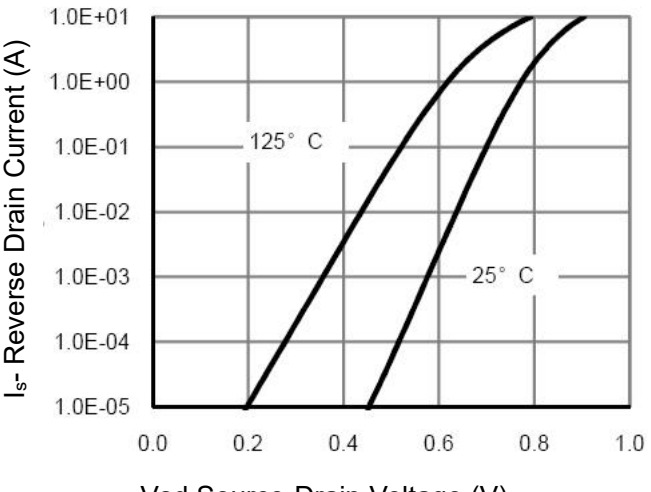


Figure 11 Source- Drain Diode Forward

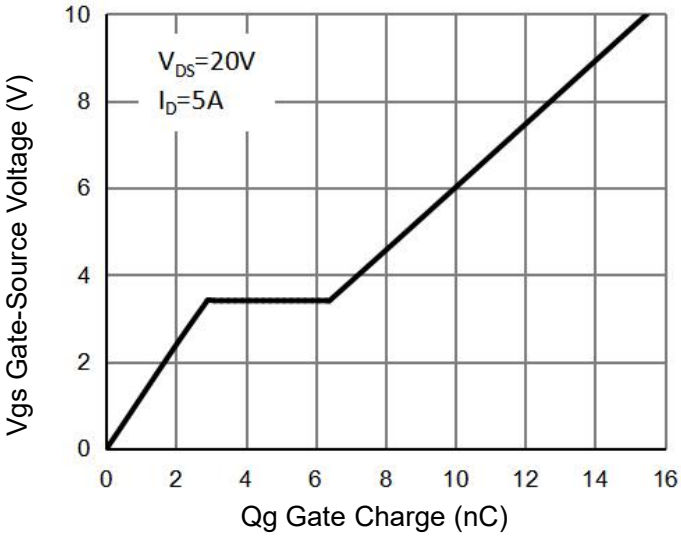


Figure 11 Gate Charge

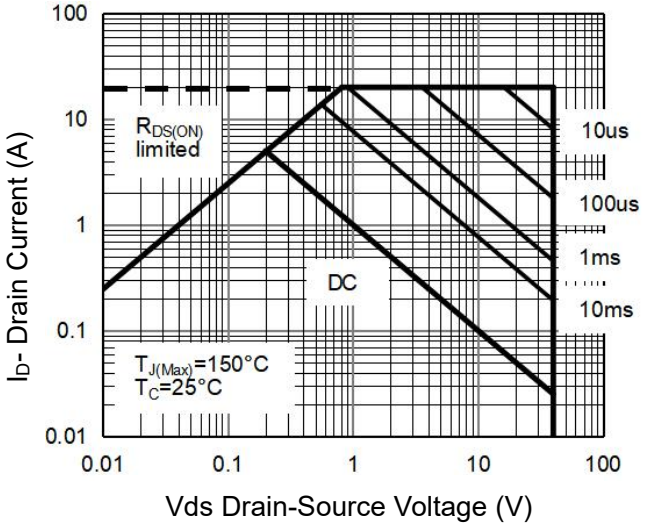


Figure 12 Safe Operation Area

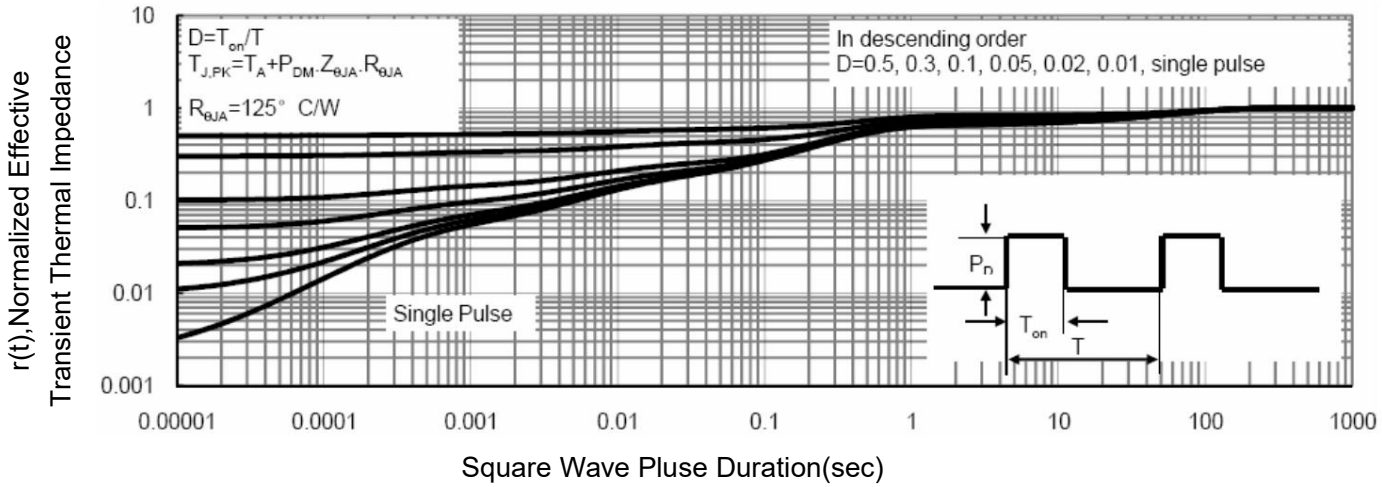
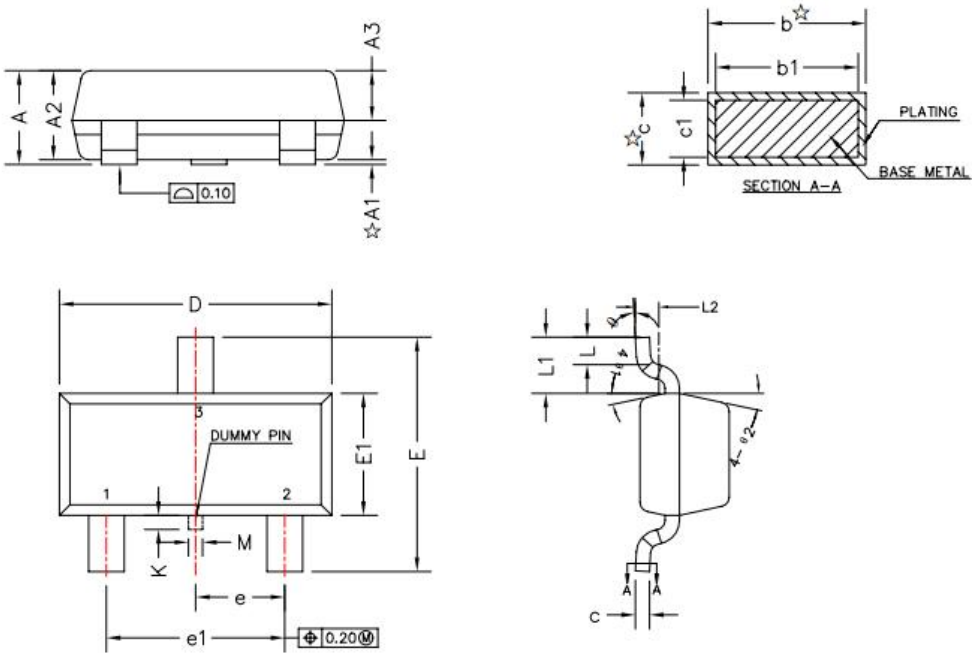


Figure 13 Normalized Maximum Transient Thermal Impedance

SOT-23 Package Information



Symbol	Millimeters	
	Min.	Max.
A	0.89	1.12
A1	0.01	0.10
A2	0.88	1.02
A3	0.43	0.63
b	0.36	0.50
b1	0.35	0.45
c	0.14	0.20
c1	0.14	0.16
D	2.80	3.00
E	2.35	2.64
E1	1.20	1.40
e	0.90	1.00
e1	1.80	2.00
L	0.40	0.60
L1	0.6REF	
L2	0.25BSC	
M	0.10	0.25
K	0.00	0.25
θ	0°	8°
θ1	10°	14°
θ2	10°	14°

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