

NCE N-Channel Enhancement Mode Power MOSFET

Description

The NCE1505S 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

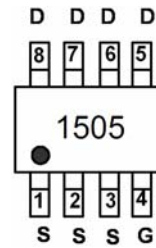
- $V_{DS} = 150V, I_D = 5.2A$
 $R_{DS(ON)} < 44m\Omega @ V_{GS} = 10V$ (Typ: $31m\Omega$)
- High density cell design for ultra low $R_{ds(on)}$
- Fully characterized avalanche voltage and current
- Low gate to drain charge to reduce switching losses

Application

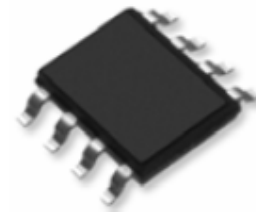
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply



Schematic diagram



Marking and pin assignment



SOP-8 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
1505	NCE1505S	SOP-8	Ø330mm	12mm	2500 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	5.2	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	3.7	A
Pulsed Drain Current(Note 1)	I_{DM}	42	A
Maximum Power Dissipation	P_D	3.5	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	35.7	$^\circ C/W$
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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	BV _{DSS}	V _{GS} =0V, I _D =250μA	150	170	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =150V, 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	2.5	3.2	4.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =5.2A	-	31	44	mΩ
Forward Transconductance	g _{FS}	V _{DS} =50V, I _D =5.2A	12	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, F=1.0MHz	-	1700	-	PF
Output Capacitance	C _{oss}		-	190	-	PF
Reverse Transfer Capacitance	C _{rss}		-	90	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =75V, I _D =3.1A V _{GS} =10V, R _{GEN} =6.5Ω	-	15	-	nS
Turn-on Rise Time	t _r		-	13	-	nS
Turn-Off Delay Time	t _{d(off)}		-	26	-	nS
Turn-Off Fall Time	t _f		-	14	-	nS
Total Gate Charge	Q _g	V _{DS} =75V, I _D =3.1A, V _{GS} =10V	-	35.8	-	nC
Gate-Source Charge	Q _{gs}		-	7.5	-	nC
Gate-Drain Charge	Q _{gd}		-	13	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =3.1A	-	-	1.2	V
Diode Forward Current (Note 2)	I _S		-	-	2.7	A
Reverse Recovery Time	trr	T _J = 25°C, I _F = 3.1A, di/dt = 100A/μs	-	50	-	nS
Reverse Recovery Charge	Q _{rr}		-	140	-	nC

Notes:

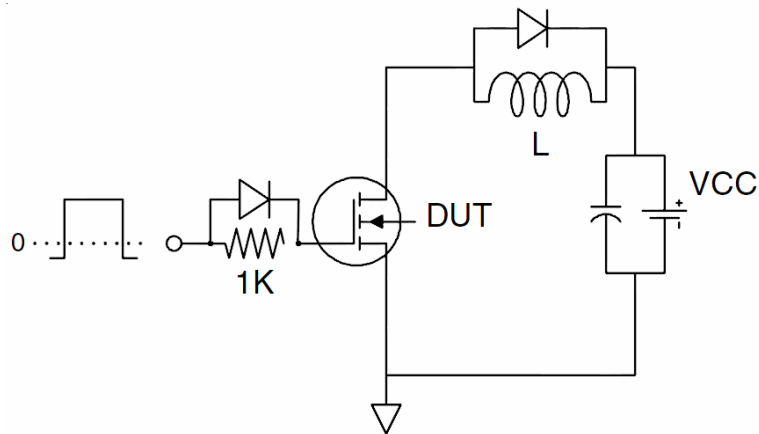
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production.

Test Circuit

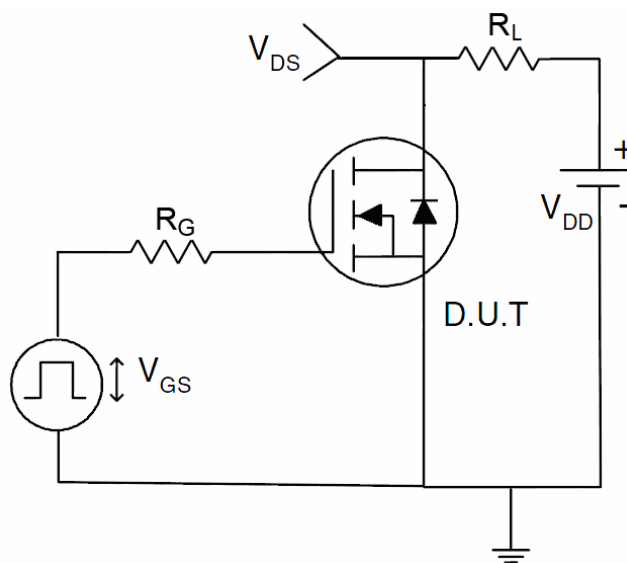
1) E_{AS} test Circuits



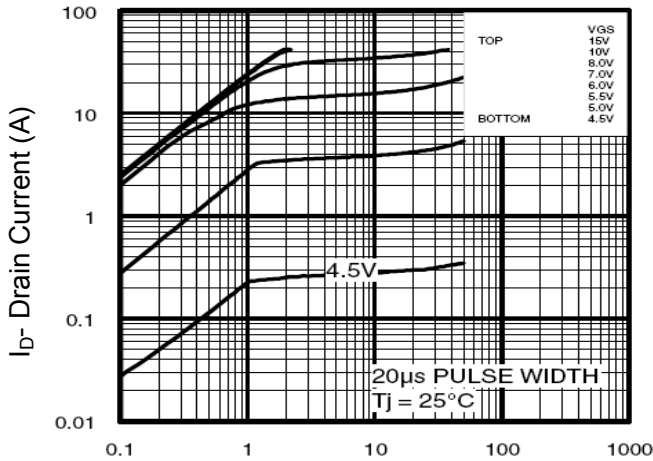
2) Gate charge test Circuit



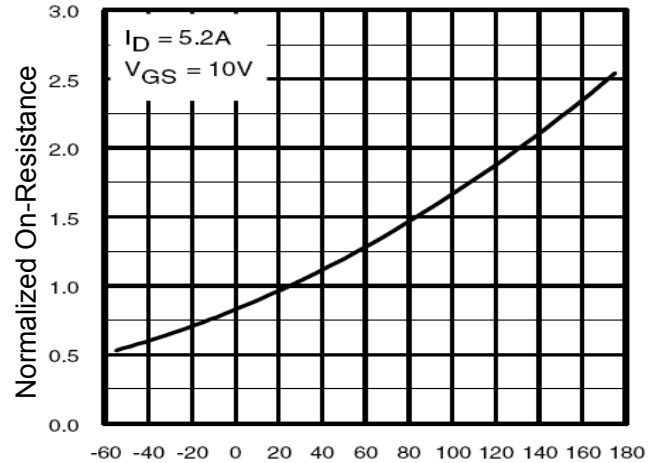
3) Switch Time Test Circuit



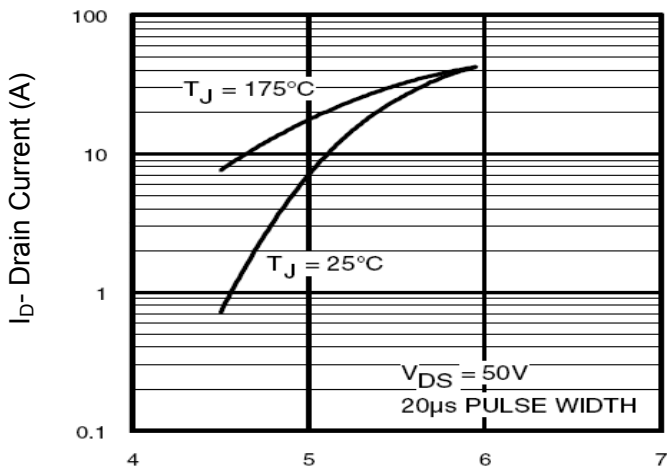
Typical Electrical and Thermal Characteristics (Curves)



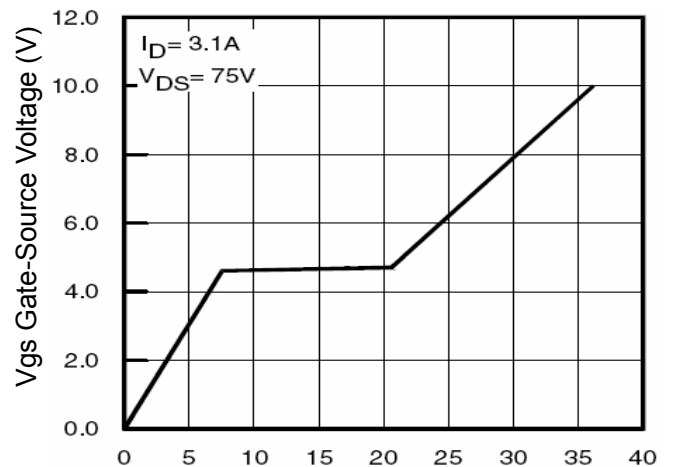
Vds Drain-Source Voltage (V)
Figure 1 Output Characteristics



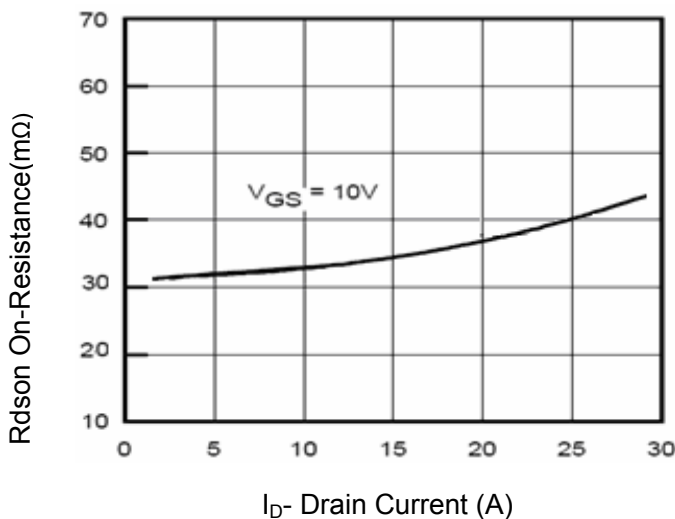
T_J-Junction Temperature(°C)
Figure 4 Rdson-Junction Temperature



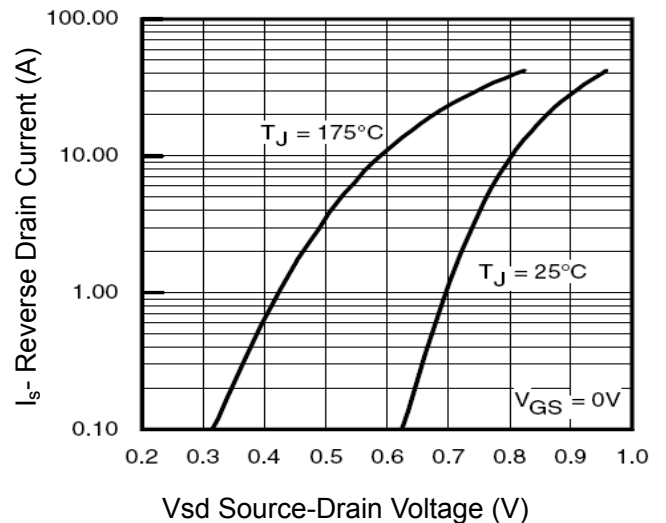
Vgs Gate-Source Voltage (V)
Figure 2 Transfer Characteristics



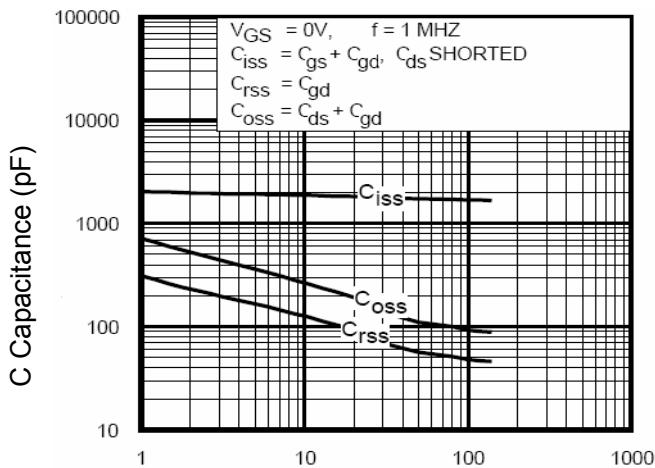
Qg Gate Charge (nC)
Figure 5 Gate Charge



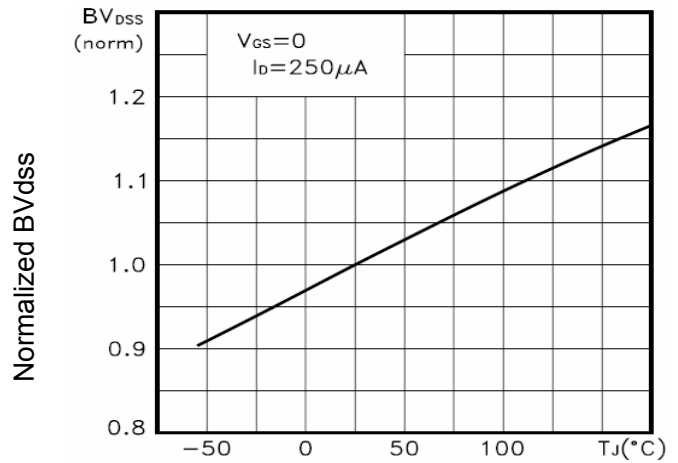
Id- Drain Current (A)
Figure 3 Rdson- Drain Current



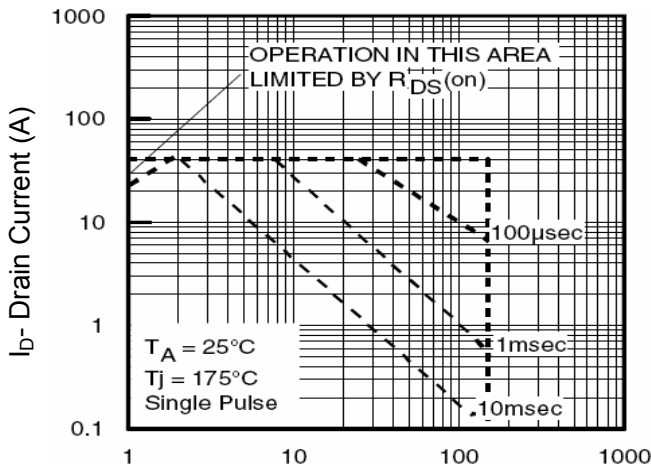
Vsd Source-Drain Voltage (V)
Figure 6 Source- Drain Diode Forward



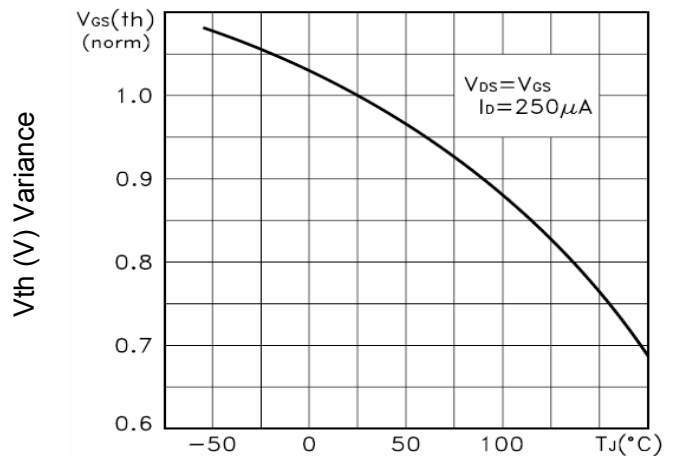
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



T_J-Junction Temperature(°C)
Figure 9 BV_{DSS} vs Junction Temperature



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



T_J-Junction Temperature(°C)
Figure 10 V_{GS(th)} vs Junction Temperature

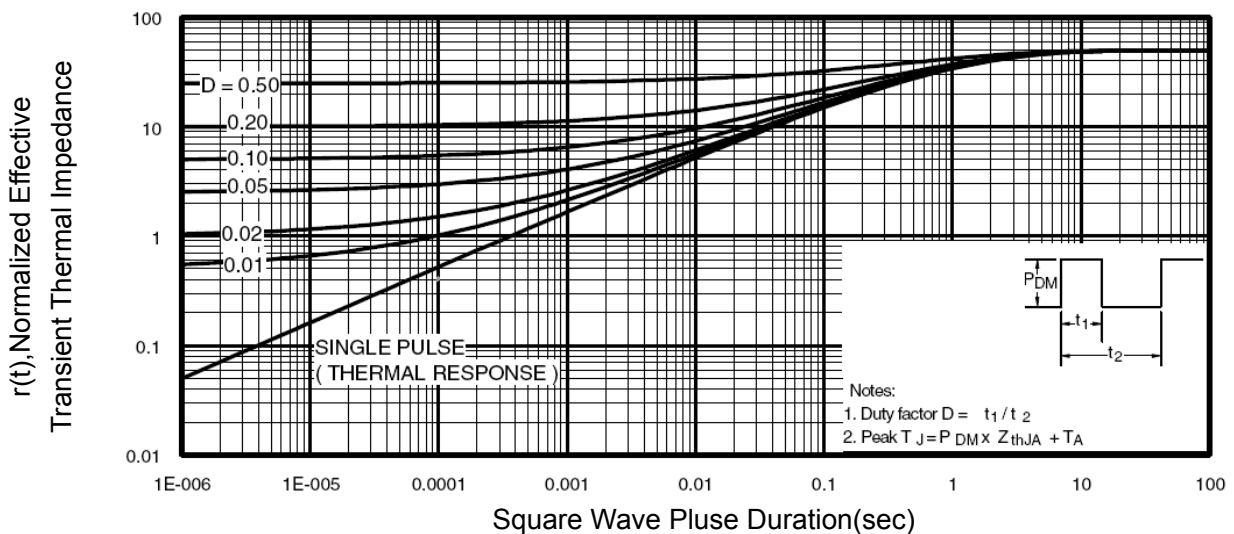
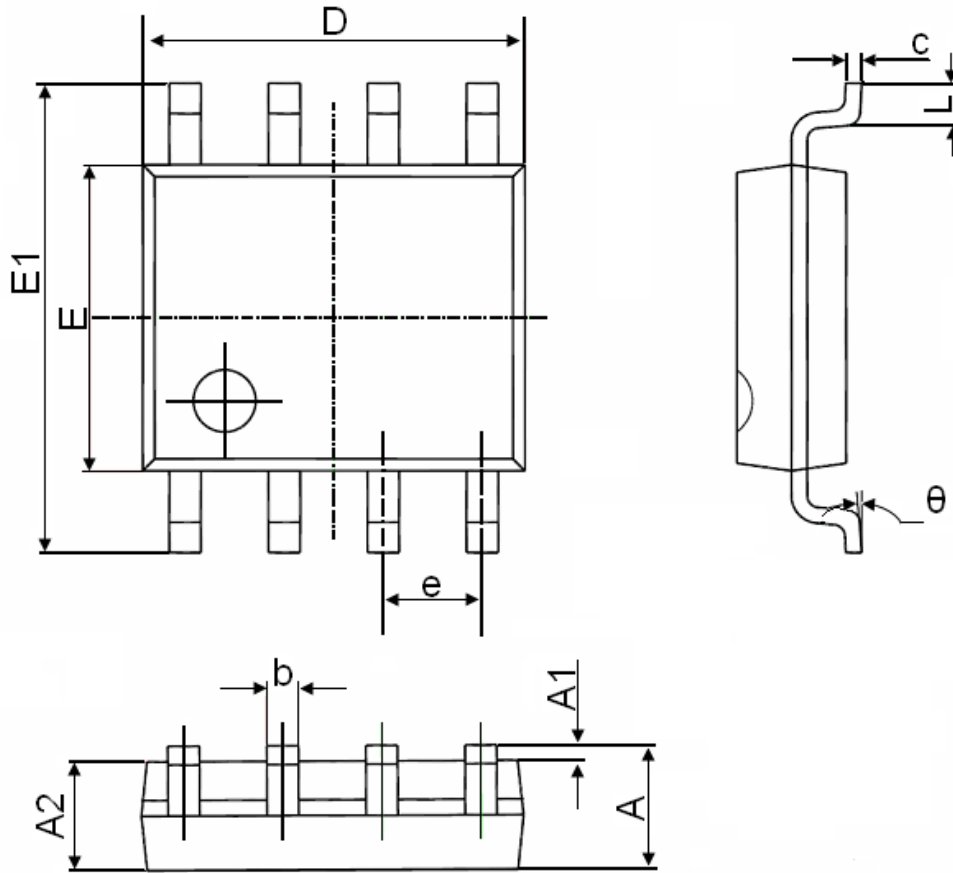


Figure 11 Normalized Maximum Transient Thermal Impedance

SOP-8 Package Information


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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