



Description

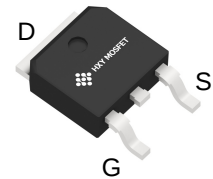
The 4N50 can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-252-2L, which accords with the RoHS standard.

General Features

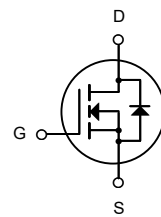
$V_{DS} = 500V, I_D = 4A$
 $R_{DS(ON)} < 3\Omega @ V_{GS} = 10V$

Application

- Power switch circuit of adaptor and charger.



TO-252-2L



N-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
4N50	TO-252-2L	5N50 XXX YYYY	2500

Absolute Maximum Ratings@ $T_J = 25^\circ C$ (unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	500	V
V_{GS}	Gate-Source Voltage	± 30	V
$I_D @ T_C = 25^\circ C$	Drain Current, $V_{GS} @ 10V$	4	A
$I_D @ T_C = 100^\circ C$	Drain Current, $V_{GS} @ 10V$	2	A
IDM	Pulsed Drain Current ¹	15	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation	32.9	W
E_{AS}	Single Pulse Avalanche Energy ⁴	67	mJ
TSTG	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$



Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V(BR)DSS	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	500	550	--	V
IDSS	Zero Gate Voltage Drain Current	$V_{DS} = 650V, V_{GS} = 0V, T_J = 25^{\circ}\text{C}$	--	--	1	μA
IGSS	Gate-Source Leakage	$V_{GS} = \pm 30V$	--	--	± 100	nA
VGS(th)	Gate-Source Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	3.0	4.0	V
RDS(on)	Drain-Source On-Resistance (Note3)	$V_{GS} = 10V, I_D = 3.5A$	--	2.4	3.0	Ω
Ciss	Input Capacitance	$V_{GS} = 0V, V_{DS} = 25V, f = 1.0\text{MHz}$	--	310	--	pF
Coss	Output Capacitance		--	39	--	
Crss	Reverse Transfer Capacitance		--	6	--	
Qg	Total Gate Charge	$V_{DD} = 400V, I_D = 3A, V_{GS} = 10V$	--	8	--	nC
Qgs	Gate-Source Charge		--	1.2	--	
Qgd	Gate-Drain Charge		--	5	--	
td(on)	Turn-on Delay Time	$V_{DD} = 250V, I_D = 3A, R_G = 25\Omega$	--	7.8	--	ns
tr	Turn-on Rise Time		--	33	--	
td(off)	Turn-off Delay Time		--	23	--	
tf	Turn-off Fall Time		--	59	--	
IS	Continuous Body Diode Current	$T_C = 25^{\circ}\text{C}$	--	--	4	A
ISM	Pulsed Diode Forward Current		--	--	12	A
VSD	Body Diode Voltage	$T_J = 25^{\circ}\text{C}, I_{SD} = 3A, V_{GS} = 0V$	--	--	1.4	V
trr	Reverse Recovery Time	$V_{GS} = 0V, I_S = 3A, di_F/dt = 100A / \mu s$	--	80	--	ns
Qrr	Reverse Recovery Charge		--	1.8	--	μC

Note :

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、The EAS data shows Max. rating . IAS = 2.4A, VDD = 50V, RG = 25 Ω , Starting TJ = 25 $^{\circ}\text{C}$
- 3、The test condition is Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$
- 4、The power dissipation is limited by 150 $^{\circ}\text{C}$ junction temperature
- 5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.



Typical Characteristics

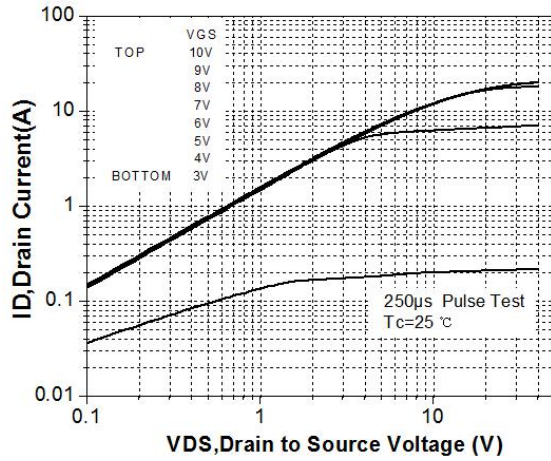


Figure 1. On-Region Characteristics

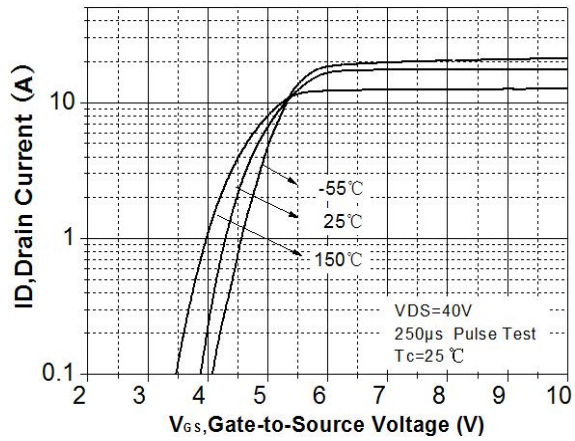


Figure 2. Transfer Characteristics

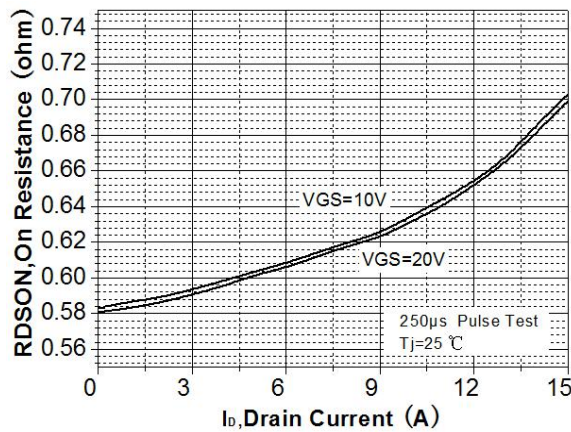


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

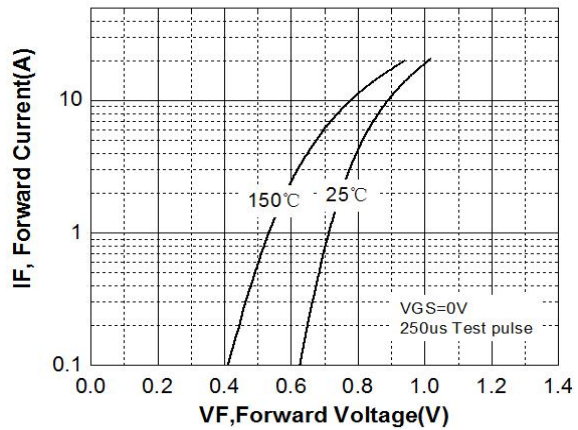


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

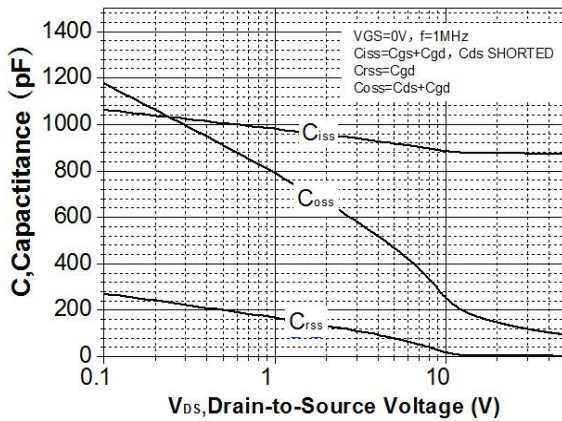


Figure 5. Capacitance Characteristics

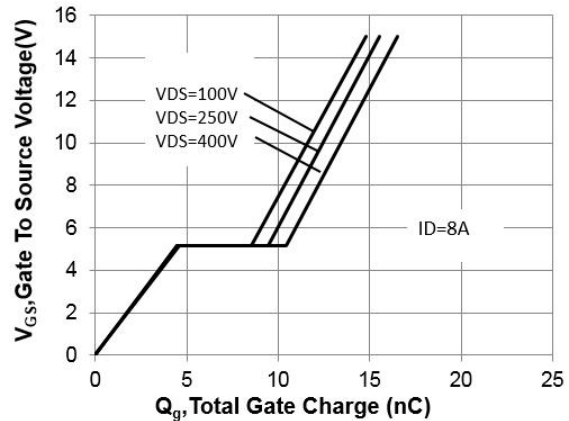


Figure 6. Gate Charge Characteristics

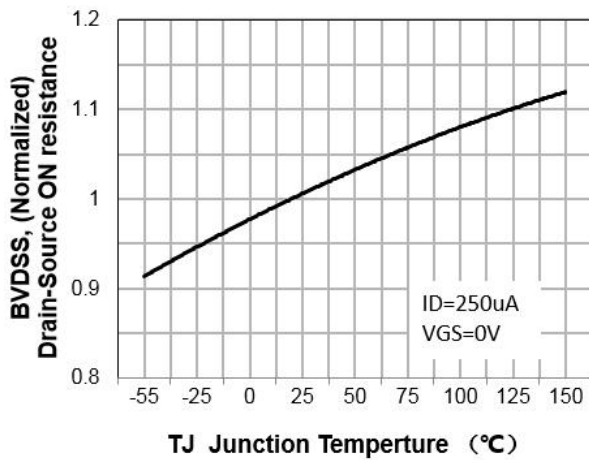


Figure 7. Breakdown Voltage Variation vs Temperature

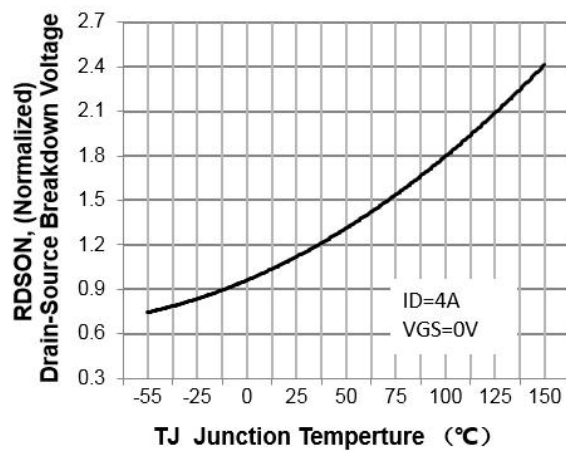


Figure 8. On-Resistance Variation vs Temperature

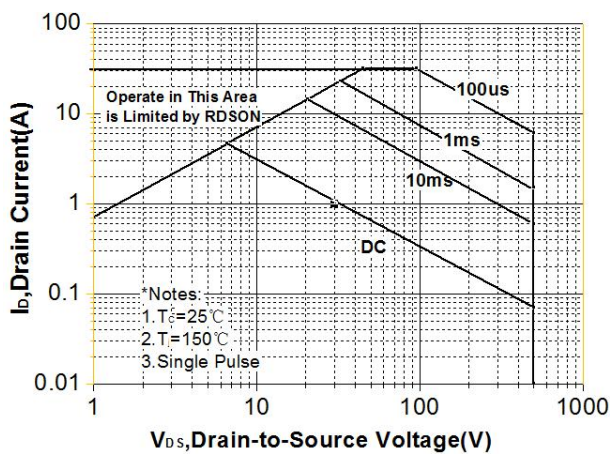


Figure 9. Maximum Safe Operating Area

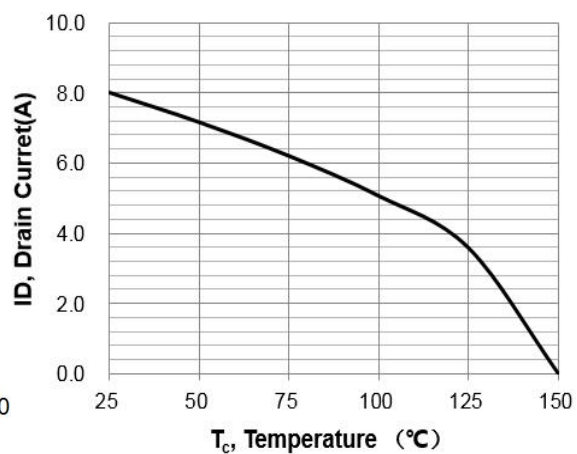


Figure 10. Maximum Drain Current vs Case Temperature

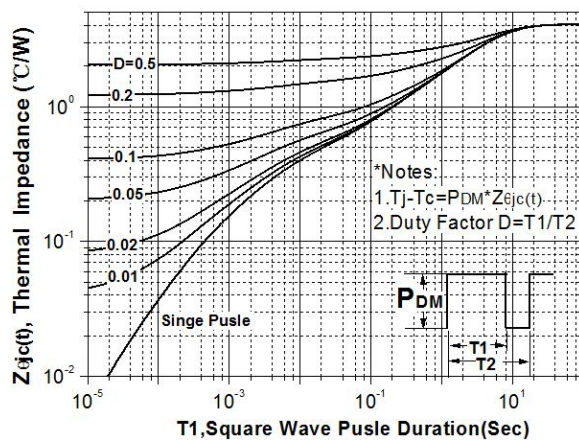
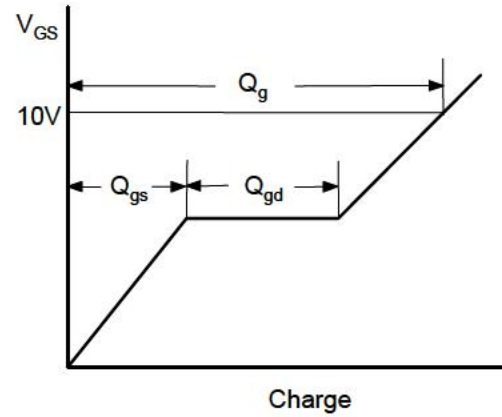
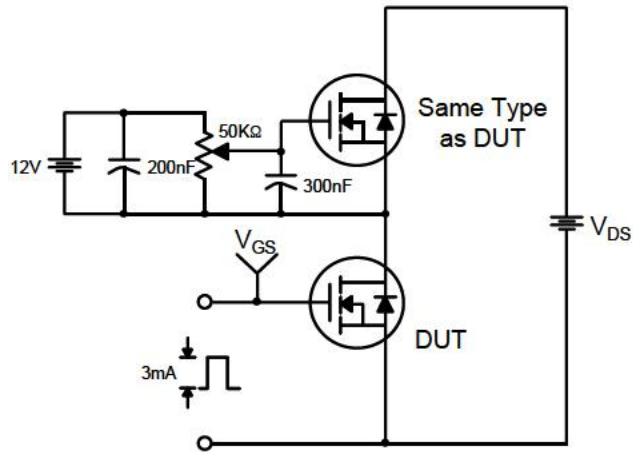


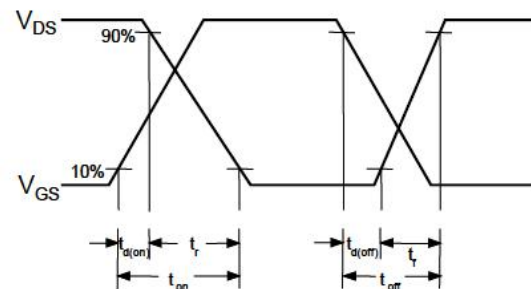
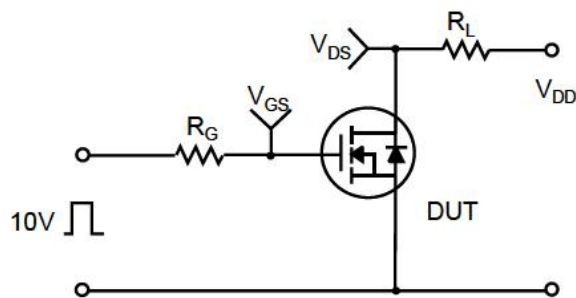
Figure 11. Transient Thermal Response Curve



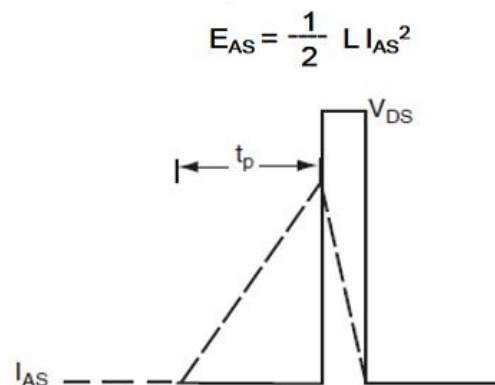
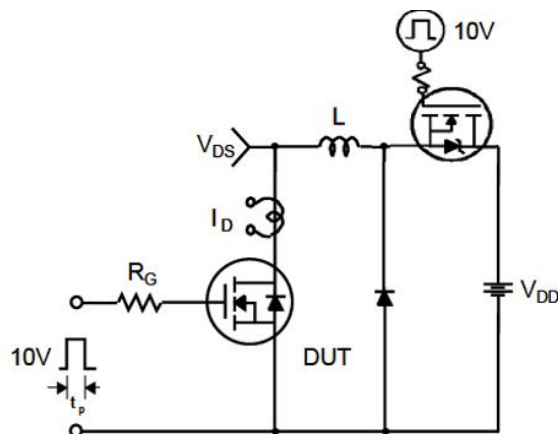
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



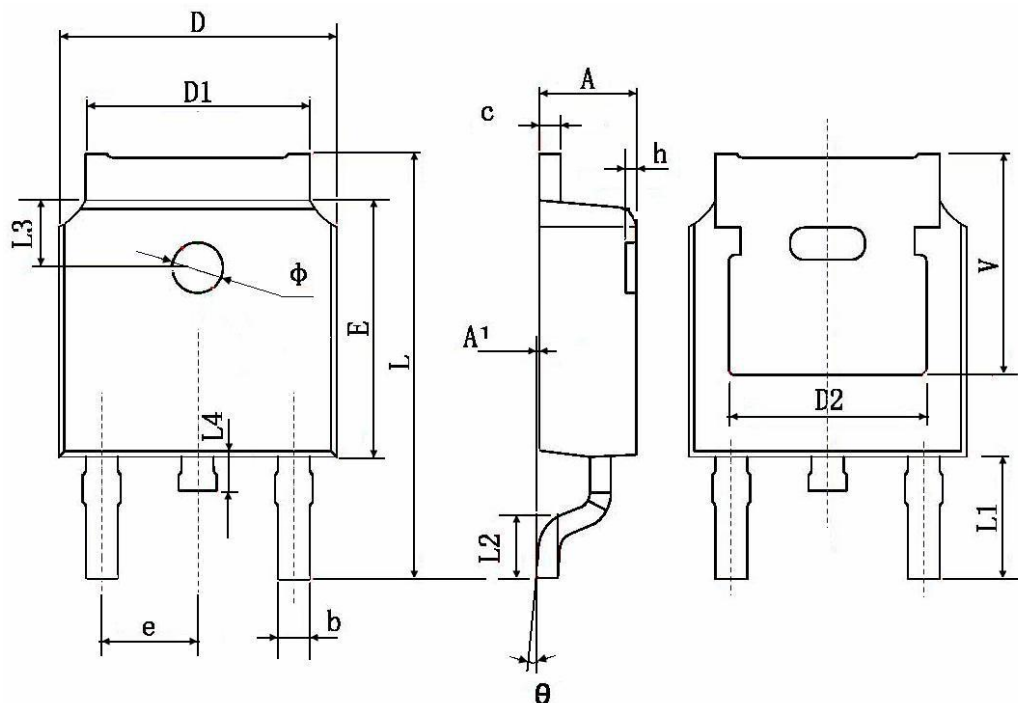
Unclamped Inductive Switching Test Circuit & Waveforms



$$E_{AS} = \frac{1}{2} L I_{AS}^2$$



TO-252-2L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	0.483 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	



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