



## Description

The HXY5N50D 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

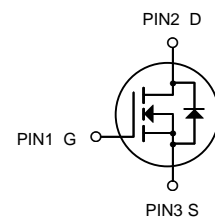
$V_{DS} = 500V, I_D = 5A$   
 $R_{DS(ON)} < 1.8\Omega @ V_{GS}=10V$

## Application

- Power switch circuit of adaptor and charger.



TO252-2L



N-Channel MOSFET

## Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
HXY5N50D	TO252-2L	5N50 XXX YYYY	2500

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

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	500	V
V <sub>GS</sub>	Gate-Source Voltage	±30	V
I <sub>D</sub> @T <sub>C</sub> =25°C	Drain Current, V <sub>GS</sub> @ 4.5V	5	A
I <sub>D</sub> @T <sub>C</sub> =100°C	Drain Current, V <sub>GS</sub> @ 4.5V	2.6	A
IDM	Pulsed Drain Current <sup>1</sup>	20	A
P <sub>D</sub> @T <sub>C</sub> =25°C	Total Power Dissipation	24.5	W
E <sub>AS</sub>	Single Pulse Avalanche Energy <sup>4</sup>	167	mJ
TSTG	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C



**Electrical Characteristics** (Tc= 25°C unless otherwise specified):

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	500			V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$ , Referenced to 25°C		0.49		V/°C
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 400\text{ V}, TC = 125^\circ\text{C}$			10	$\mu\text{A}$
$I_{GSSF}$	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$			100	nA
$I_{GSSR}$	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$			-100	nA
<b>On Characteristics</b>						
$V_{GS(TH)}$	Gate Threshold voltage	$V_{DS}=V_{GS}, I_D=250\ \mu\text{A}$	2.0		4.0	V
$R_{DS(On)}$	Drain-Source on-state resistance	$V_{GS}=10\text{ V}, I_D = 2\text{ A}, T_J = 25^\circ\text{C}$		1.45	1.8	$\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 40\text{ V}, I_D = 2.5\text{ A}$ (Note 4)		2.90		S
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$		415		pF
$C_{oss}$	Output capacitance			58		pF
$C_{rss}$	Reverse transfer capacitance			1.4		pF
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn On Delay Time	$V_{DD} = 250\text{ V}, I_D = 5\text{ A}, R_G = 25\ \Omega$ (Note 4, 5)		7		ns
$t_r$	Rising Time			22		ns
$t_{d(off)}$	Turn Off Delay Time			15		ns
$t_f$	Fall Time			23		ns
$Q_g$	Total Gate Charge	$V_{DS} = 400\text{ V}, I_D = 5\text{ A}, V_{GS} = 10\text{ V}$ (Note 4, 5)		13		nC
$Q_{gs}$	Gate-Source Charge			4.9		nC
$Q_{gd}$	Gate-Drain Charge			2.3		nC
<b>Drain-source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum continuous Drain-source Diode Forward Current				5	A
$I_{SM}$	Maximum Pulsed Drain-Source Diode Forward Current				20	A
$V_{SD}$	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 5\text{ A}$			1.2	V
$t_{rr}$	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 5\text{ A}, di_F / dt = 100\text{ A}/\mu\text{s}$		289		ns
$Q_{rr}$	Reverse Recovery Charge	Note 4)		1.2		$\mu\text{C}$

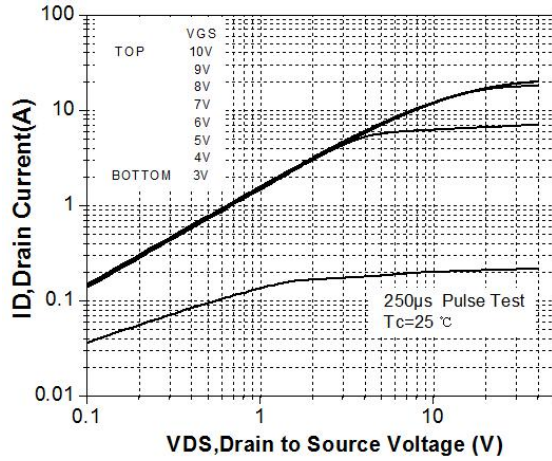
**Notes:**

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 10.6 mH, IAS = 5 A, VDD = 50V, RG = 25  $\Omega$ , Starting TJ = 25°C
3. ISD ≤ 5A, di/dt ≤ 200A/us, VDD ≤ BVDSS, Starting TJ = 25°C
4. Pulse Test : Pulse width ≤ 300us, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

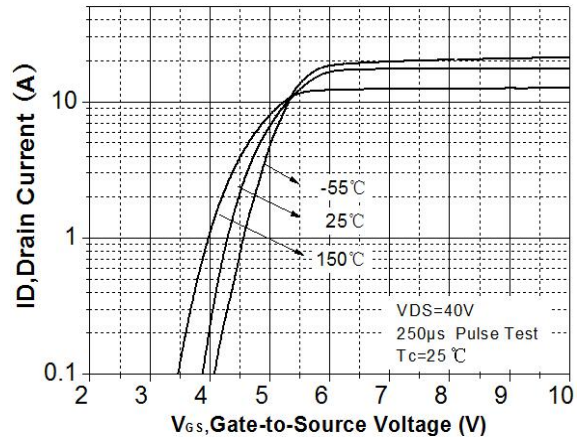


## Typical Characteristics

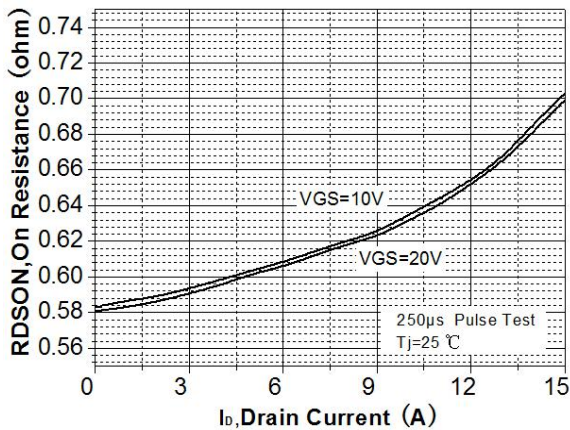
**Table 7 Reverse diode characteristics**



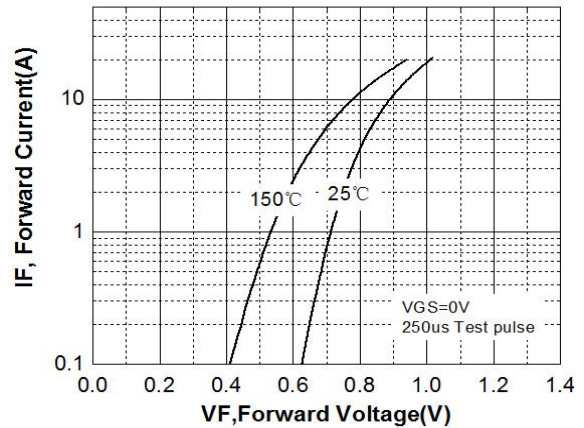
**Figure 1. On-Region Characteristics**



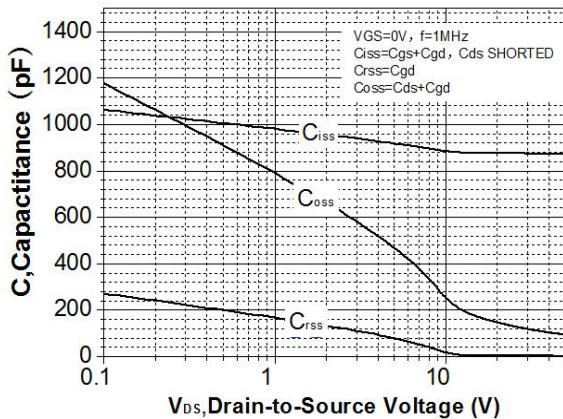
**Figure 2. Transfer Characteristics**



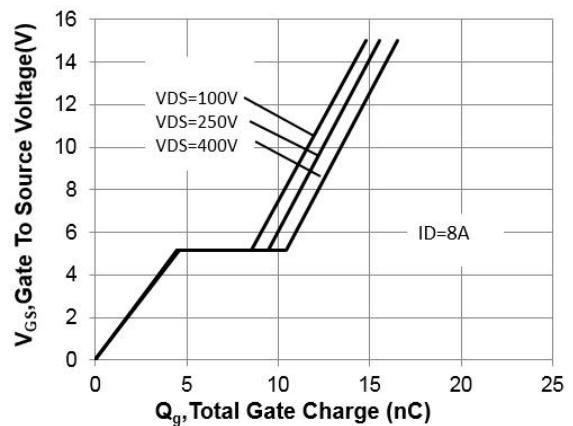
**Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage**



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



**Figure 5. Capacitance Characteristics**



**Figure 6. Gate Charge Characteristics**

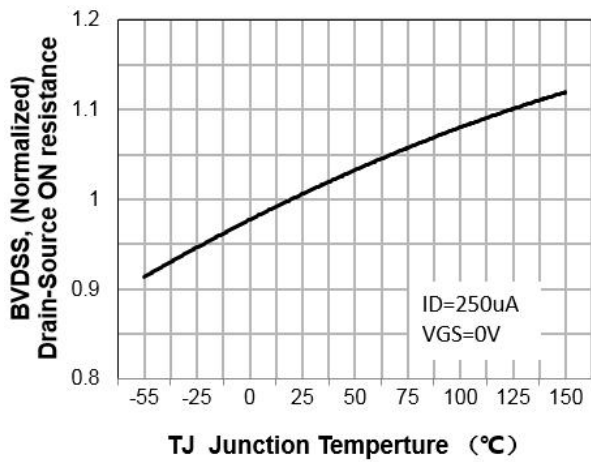


Figure 7. Breakdown Voltage Variation vs Temperature

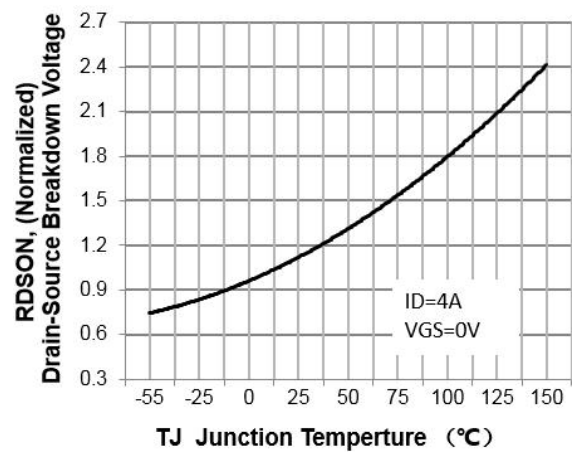


Figure 8. On-Resistance Variation vs Temperature

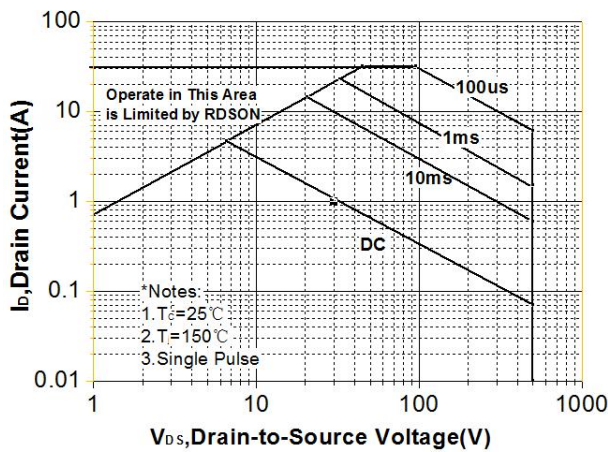


Figure 9. Maximum Safe Operating Area

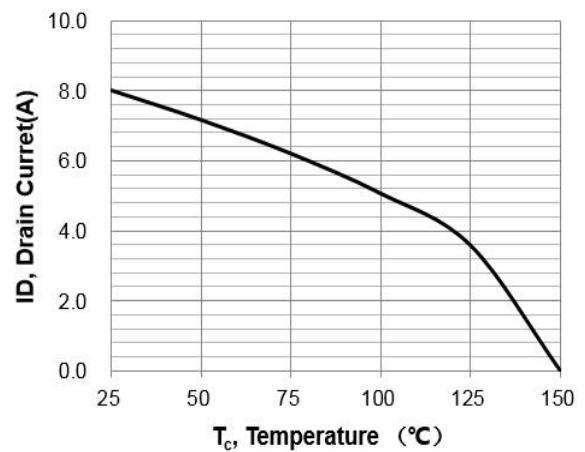
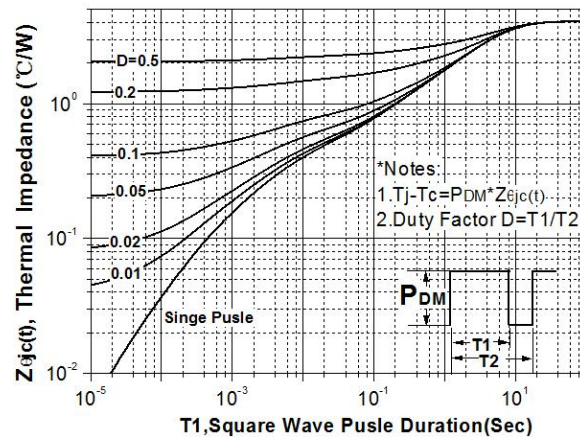


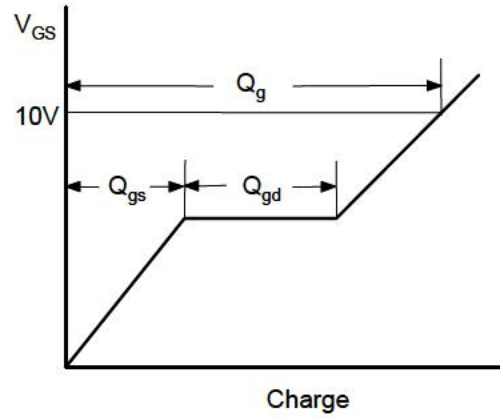
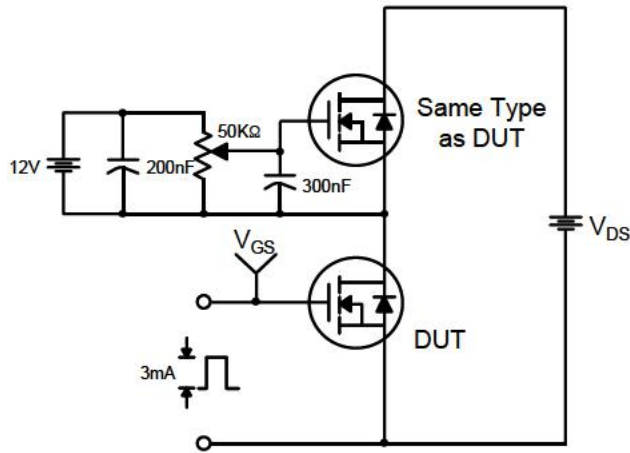
Figure 10. Maximum Drain Current vs Case Temperature Figure



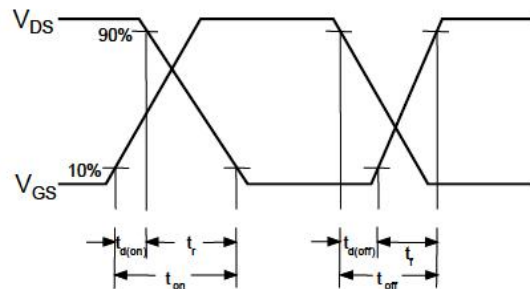
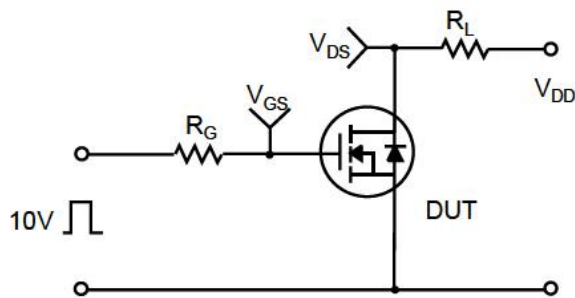
11. Transient Thermal Response Curve



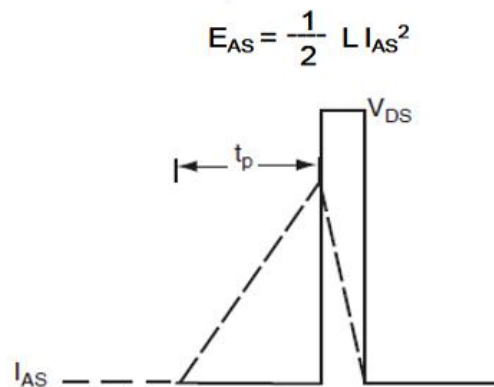
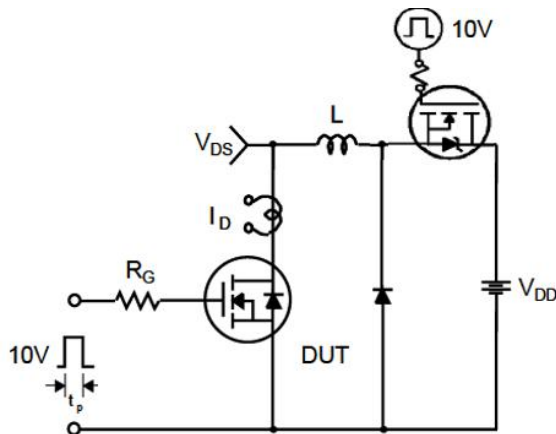
### Gate Charge Test Circuit & Waveform



### Resistive Switching Test Circuit & Waveforms

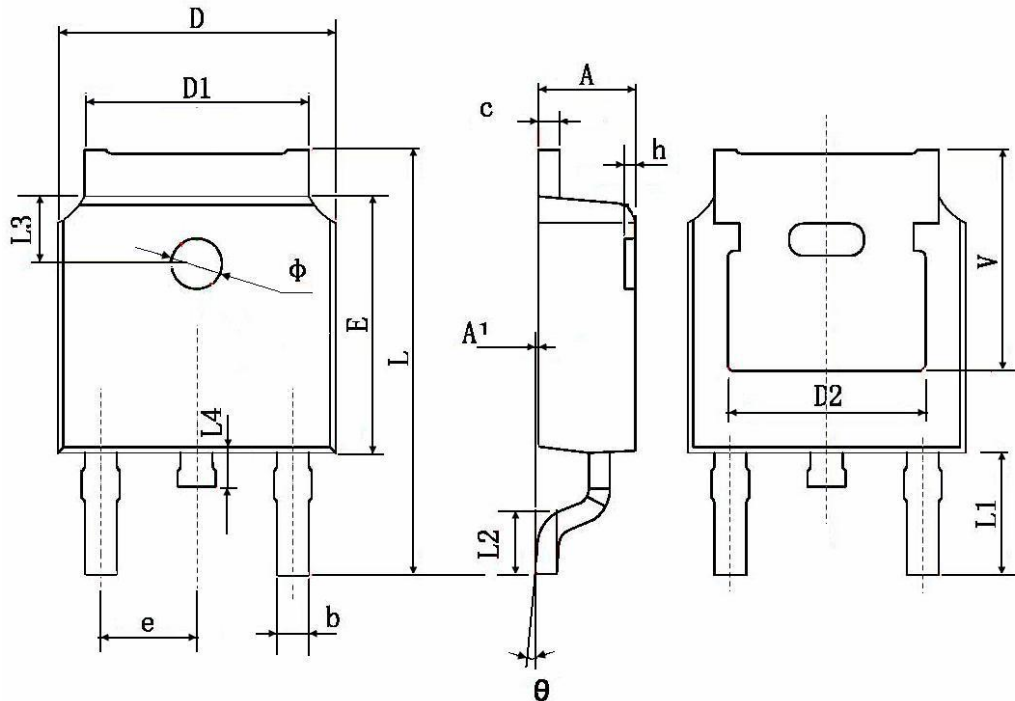


### Unclamped Inductive Switching Test Circuit & Waveforms





### TO252-2L 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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