



## 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

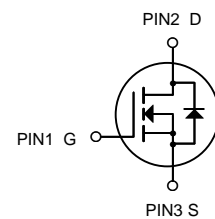
$V_{DS} = 500V, I_D = 5A$   
 $R_{DS(ON)} < 1.8\Omega @ V_{GS}=10V$

## 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** (T<sub>c</sub>= 25°C unless otherwise specified):

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	500			V
ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25°C		0.49		V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 500 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 400 V, TC = 125°C			10	μA
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	V <sub>GS</sub> = 30 V, V <sub>DS</sub> = 0 V			100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	V <sub>GS</sub> = -30 V, V <sub>DS</sub> = 0 V			-100	nA
<b>On Characteristics</b>						
V <sub>GS(TH)</sub>	Gate Threshold voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250 uA	2.0		4.0	V
R <sub>DS(On)</sub>	Drain-Source on-state resistance	V <sub>GS</sub> =10 V, I <sub>D</sub> = 2A, T <sub>J</sub> = 25°C		1.45	1.8	Ω
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 40 V, I <sub>D</sub> = 2.5 A (Note 4)		2.90		S
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input capacitance	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz		415		pF
C <sub>oss</sub>	Output capacitance			58		pF
C <sub>rss</sub>	Reverse transfer capacitance			1.4		pF
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn On Delay Time	V <sub>DD</sub> = 250 V, I <sub>D</sub> = 5 A, R <sub>G</sub> = 25 Ω (Note 4, 5)		7		ns
t <sub>r</sub>	Rising Time			22		ns
t <sub>d(off)</sub>	Turn Off Delay Time			15		ns
t <sub>f</sub>	Fall Time			23		ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 400 V, I <sub>D</sub> = 5 A, V <sub>GS</sub> = 10 V (Note 4, 5)		13		nC
Q <sub>gs</sub>	Gate-Source Charge			4.9		nC
Q <sub>gd</sub>	Gate-Drain Charge			2.3		nC
<b>Drain-source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum continuous Drain-source Diode Forward Current				5	A
I <sub>SM</sub>	Maximum Pulsed Drain-Source Diode Forward Current				20	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 5 A			1.2	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 5 A, di <sub>F</sub> / dt = 100 A/μs		289		ns
Q <sub>rr</sub>	Reverse Recovery Charge	Note 4)		1.2		μC

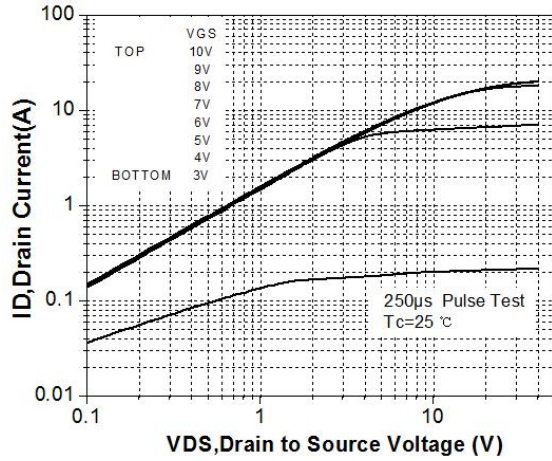
**Notes:**

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 10.6 mH, I<sub>AS</sub> = 5 A, V<sub>DD</sub> = 50V, R<sub>G</sub> = 25 Ω, Starting T<sub>J</sub> = 25°C
3. I<sub>SD</sub> ≤ 5A, di/dt ≤ 200A/μs, V<sub>DD</sub> ≤ BVDSS, Starting T<sub>J</sub> = 25°C
4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

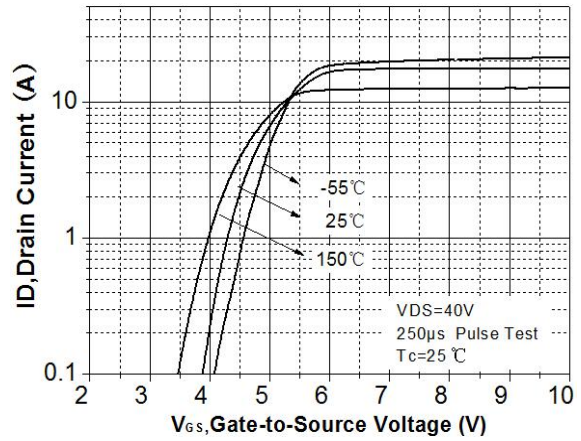


## Typical Characteristics

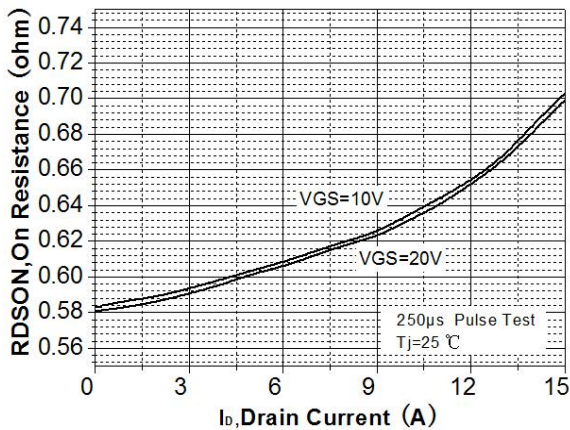
**Table 7 Reverse diode characteristics**



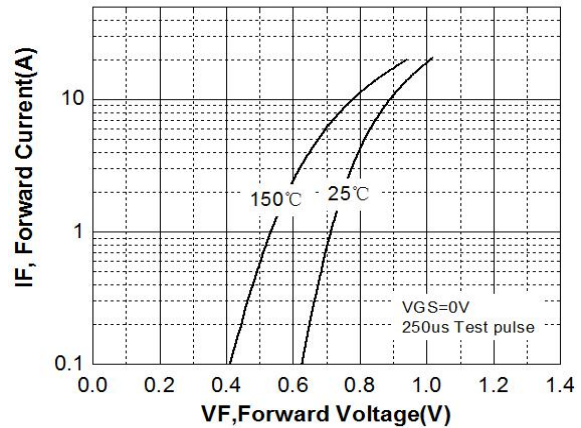
**Figure 1. On-Region Characteristics**



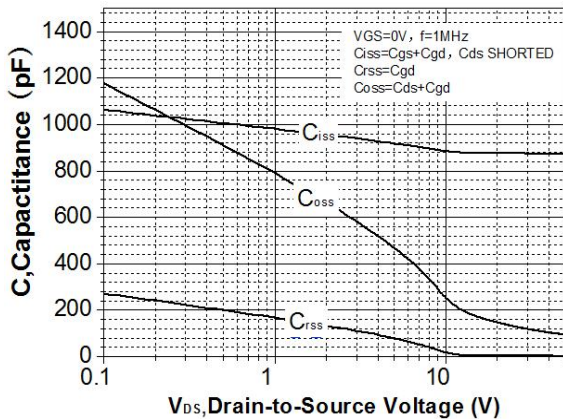
**Figure 2. Transfer Characteristics**



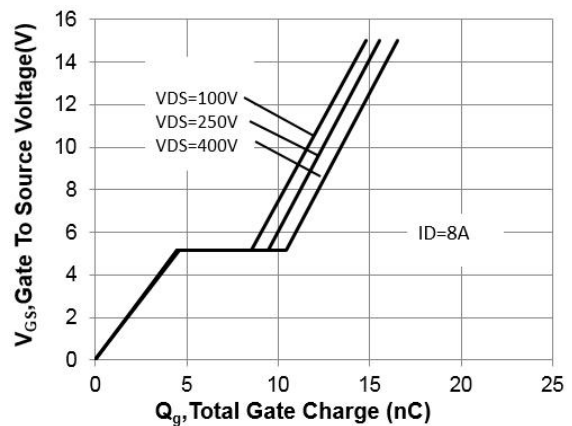
**Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage**



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



**Figure 5. Capacitance Characteristics**



**Figure 6. Gate Charge Characteristics**

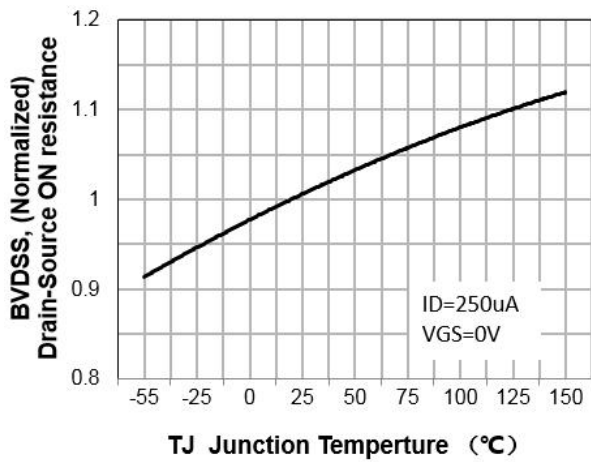


Figure 7. Breakdown Voltage Variation vs Temperature

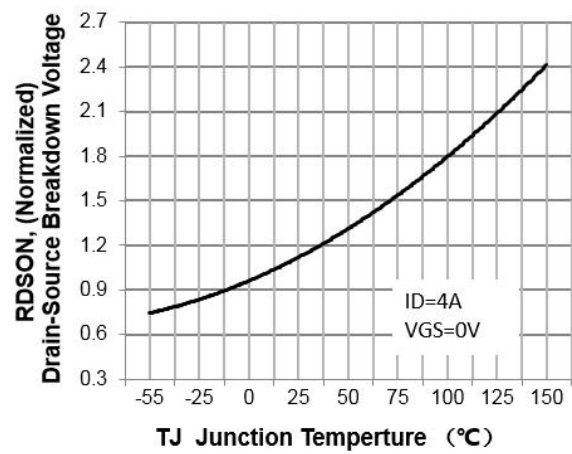


Figure 8. On-Resistance Variation vs Temperature

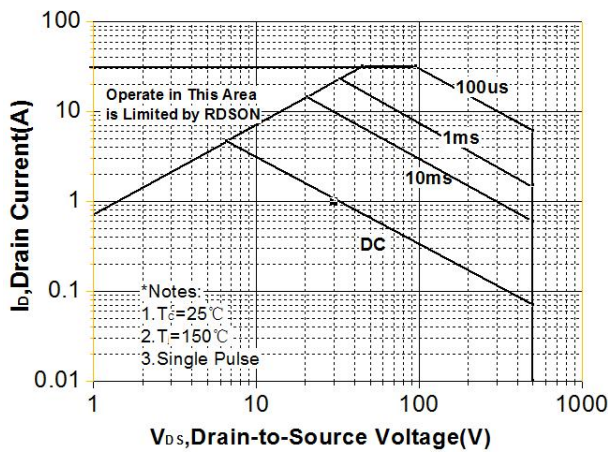


Figure 9. Maximum Safe Operating Area

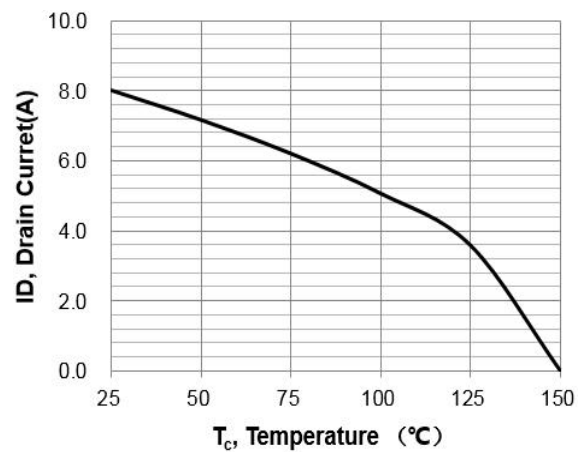
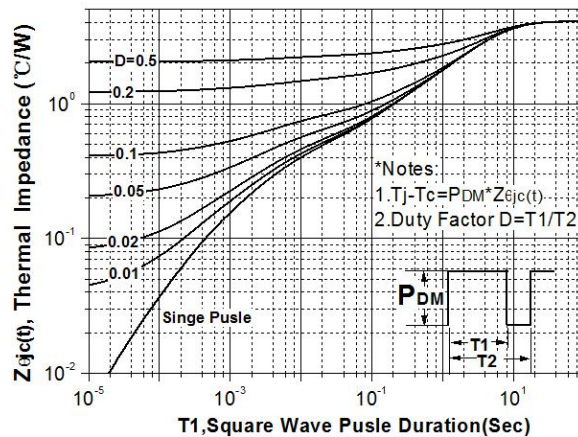


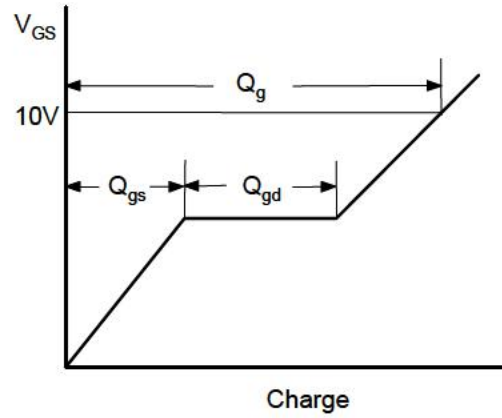
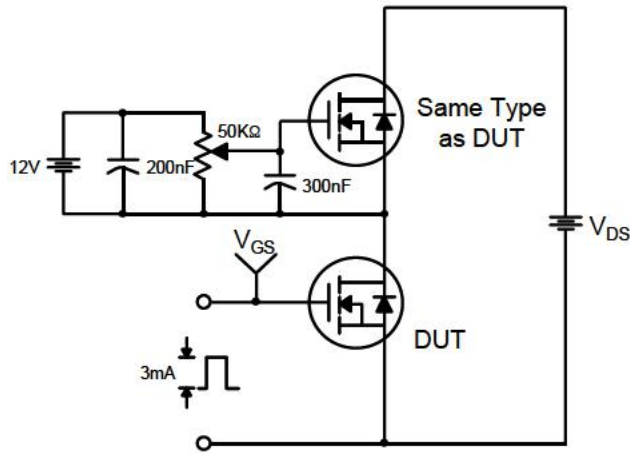
Figure 10. Maximum Drain Current vs Case Temperature



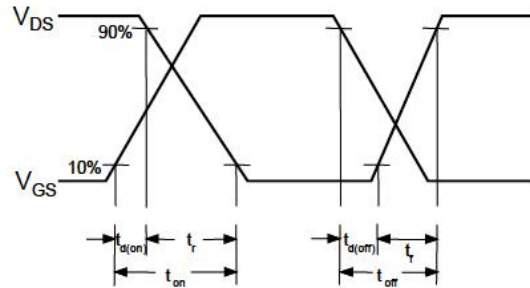
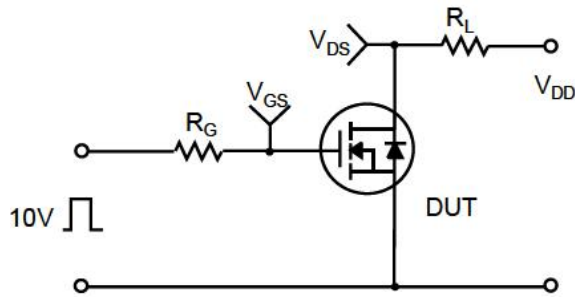
11. Transient Thermal Response Curve



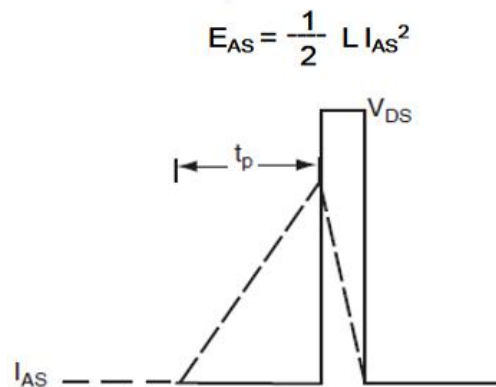
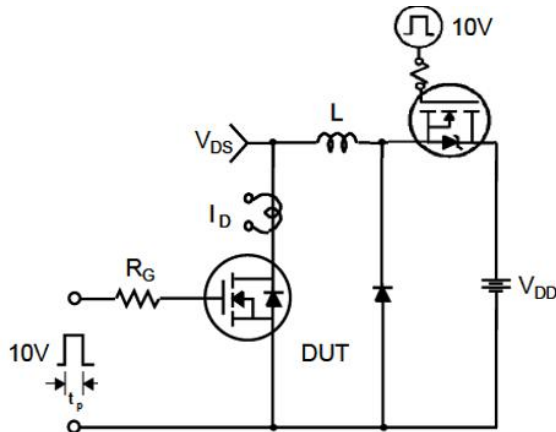
### Gate Charge Test Circuit & Waveform



### Resistive Switching Test Circuit & Waveforms



### Unclamped Inductive Switching Test Circuit & Waveforms







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