

5N50

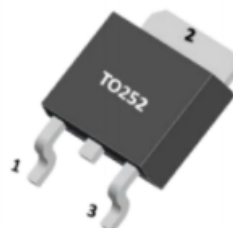
N-CHANNEL POWER MOSFET

5A, 500V N-CHANNEL POWER MOSFET

■ DESCRIPTION

The 5N50 is an N-channel mode power MOSFET using our advanced technology to provide customers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode

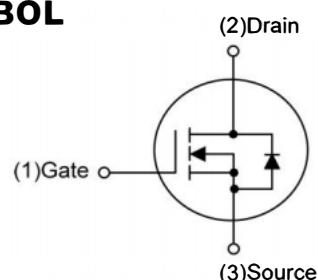
The HY5N50A is generally applied in high efficiency switch mode power supplies, active power factor correction and electronic lamp ballasts based on half bridge topology.



FEATURES

- * $R_{DS(ON)} < 1.4\Omega$ @ $V_{GS} = 10V$, $I_D = 2.5A$
- * 100% avalanche tested
- * High switching speed

SYMBOL



■ ABSOLUTE MAXIMUM RATINGS($T_A=25^\circ C$, unless otherwise specified.)

SYMBOL	PARAMETER		VALUE	UNIT
V_{DS}	Drain-Source Voltage		500	V
V_{GS}	Gate Source Voltage		± 30	V
I_{AR}	Avalanche Current (Note 2)		5	A
I_D	Drain Current	Continuous	5	A
I_{DM}		Pulsed (Note 2)	20	
E_{AS}	Avalanche Energy	Single Pulsed (Note 3)	300	mJ
E_{AR}		Repetitive (Note 2)	7.3	
dv/dt	Peak Diode Recovery dv/dt (Note 4)		4.5	V/ns
P_D	Power Dissipation	TO-220F	38	W
		TO-252	54	W
T_J	Junction Temperature		150	$^\circ C$
T_{STG}	Storage Temperature		-55 to 150	$^\circ C$

**5N50****N-CHANNEL POWER MOSFET**

- Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. L = 21.5mH, IAS= 5A, VDD= 50V, RG= 25Ω, Starting TJ= 25°C
4. ISD ≤ 5A, di/dt ≤ 200A/μs, VDD ≤ BVDSS, Starting TJ= 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F	θ_{JA}	62.5	°C/W
	TO-252		110	
Junction to Case	TO-220F	θ_{JC}	3.25	°C/W
	TO-252		2.13	

■ ELECTRICAL CHARACTERISTICS (TA=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BVDSS	VGS=0V, ID=250μA	500			V
Drain-Source Leakage Current		IDSS	VDS=500V, VGS=0V			1	μA
			VDS=400V, TC=125°C			10	μA
Gate-Source Leakage Current	Forward	IGSS	VGS=+30V, VDS=0V			+100	nA
	Reverse		VGS=-30V, VDS=0V			-100	
Breakdown Voltage Temperature Coefficient		ΔBVDSS/ΔTJ	ID=250μA, Referenced to 25°C		0.5		V/°C
ON CHARACTERISTICS							
Drain-source on-state resistance		RDS(ON)	VGS=10V, ID=2.5A			1.4	Ω
Gate Threshold Voltage		VGS(TH)	VGS=VDS, ID=250μA	2.0		4.0	V
DYNAMIC PARAMETERS							
Input Capacitance		CISS	VGS=0V, VDS=25V, f=1.0MHz		535	625	pF
Output Capacitance		COSS			70	105	pF
Reverse Transfer Capacitance		CRSS			17	20	pF
SWITCHING PARAMETERS							
Turn-On Delay Time		tD(on)	VDD=30V, ID=0.5A RG=25Ω (Note 1, 2)		30	45	nS
Turn-On Rise time		tr			50	70	
Turn-Off Delay Time		tD(off)			145	165	
Turn-Off Fall time		tf			72	105	

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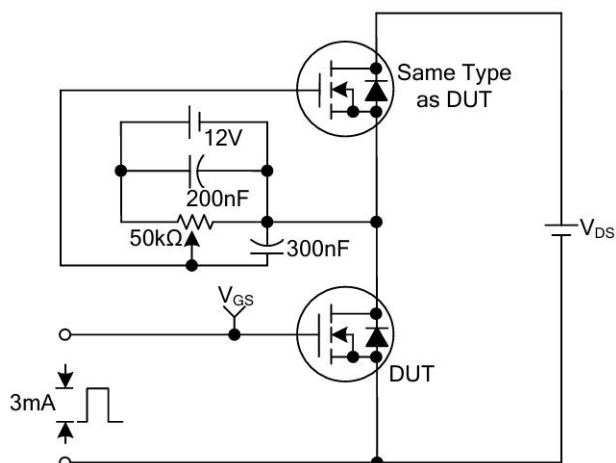
N-CHANNEL POWER MOSFET

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Total gate charge	Qg	V _{DS} =50V,V _{GS} =10V I _D =1.3A,I _G =100μA (Note 1, 2)		20	24	nC
Gate-source charge	Qgs			4		
Gate-drain charge	Qgd			5		
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	VSD	VGS = 0 V, IS =5A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	IS				5	A
Maximum Pulsed Drain-Source Diode Forward Current	ISM				20	A
Reverse Recovery Time	trr	VGS = 0 V, IS = 5A dIF / dt = 100 A/μs (Note 1)		263		ns
Reverse Recovery Charge	Qrr			1.9		μC

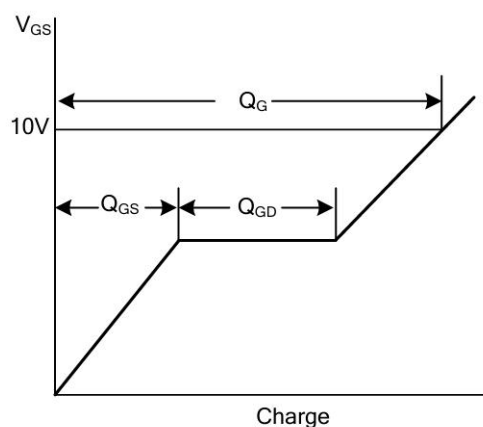
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

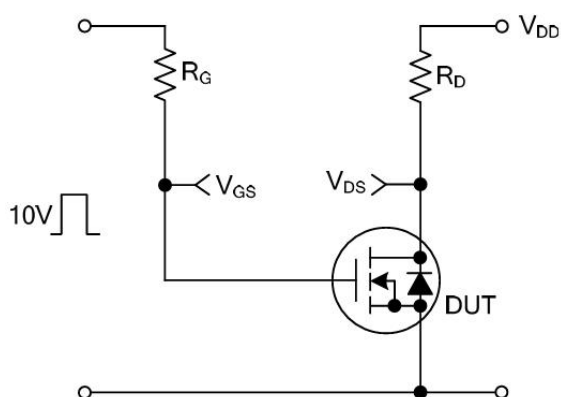
TEST CIRCUITS AND WAVEFORMS



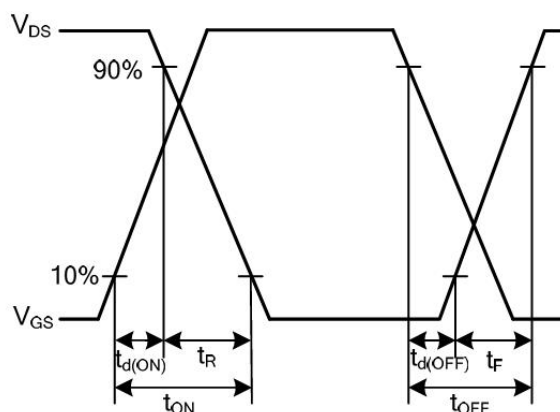
Gate Charge Test Circuit



Gate Charge Waveforms

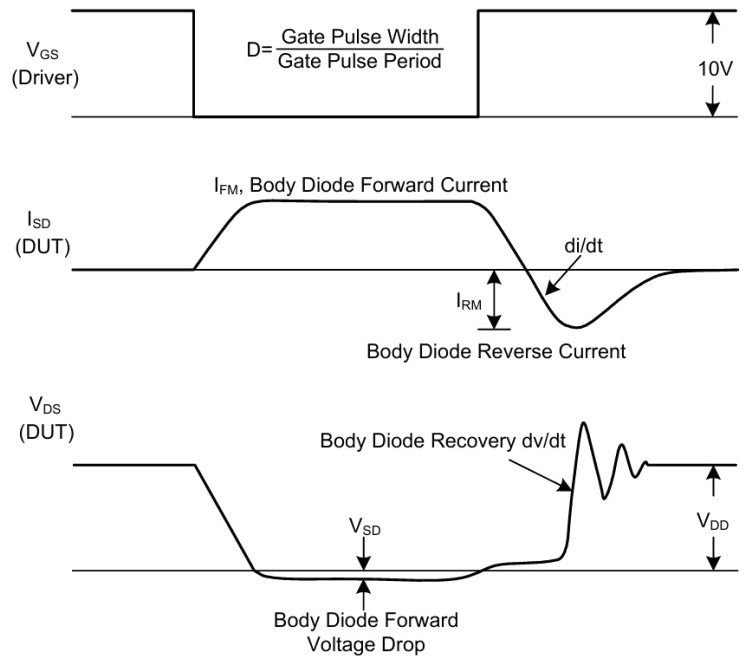
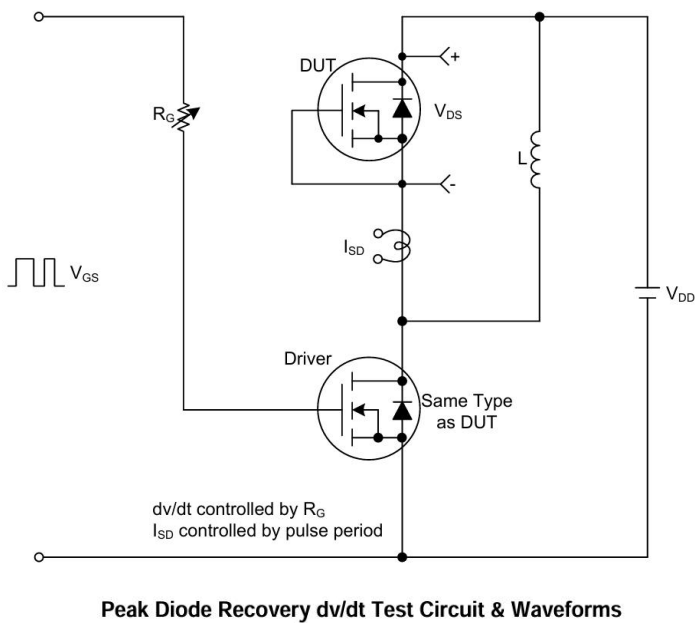
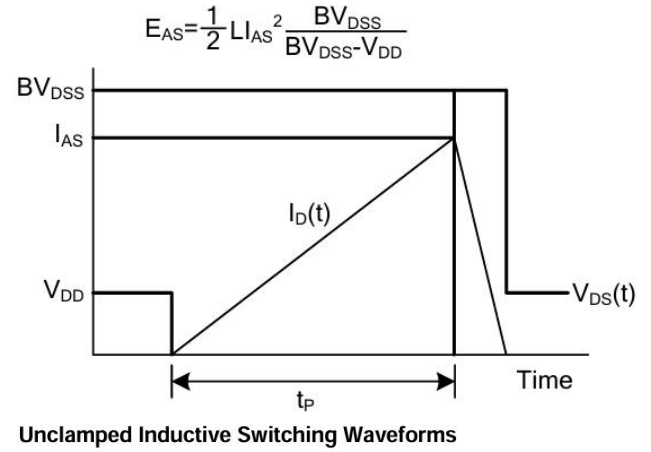
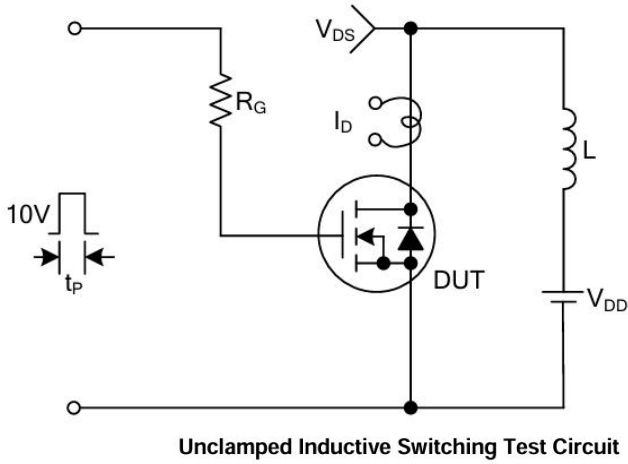


Resistive Switching Test Circuit



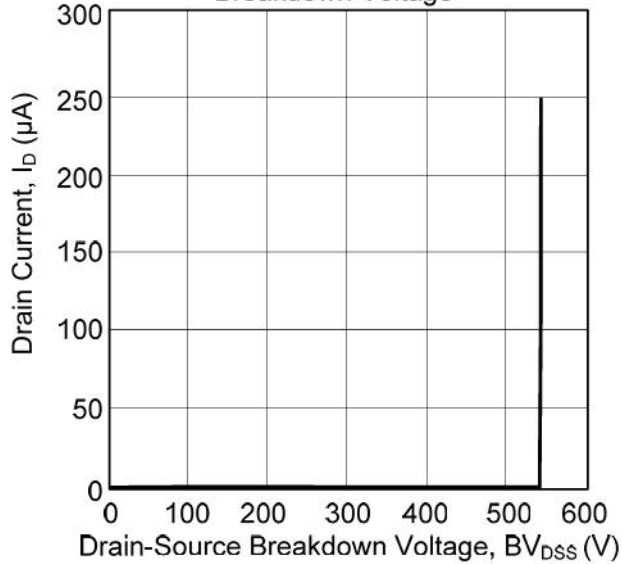
Resistive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS(Con.t)

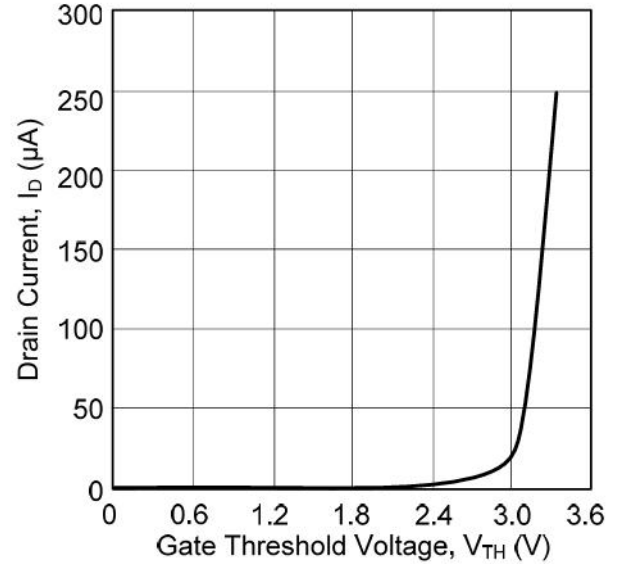


TYPICAL CHARACTERISTICS

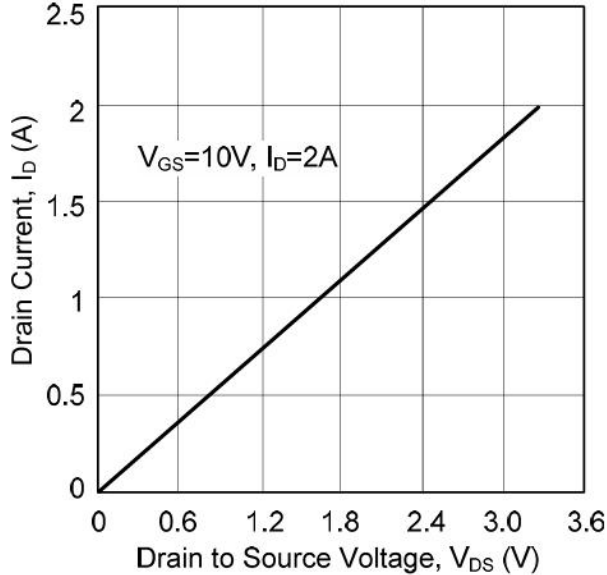
Drain Current vs. Drain-Source Breakdown Voltage



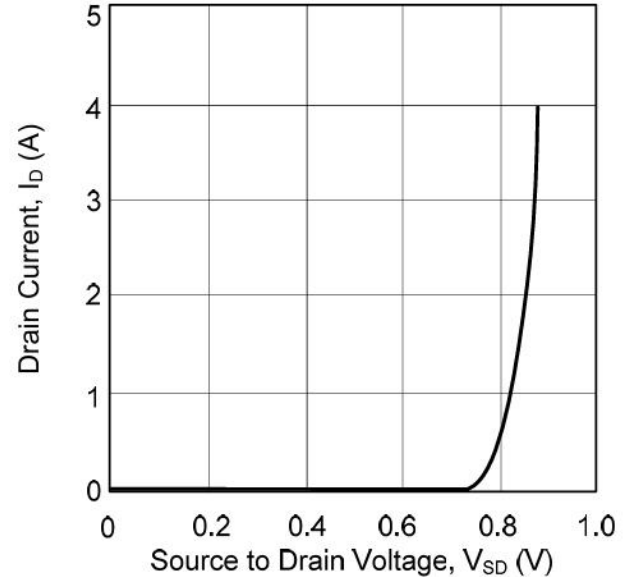
Drain Current vs. Gate Threshold Voltage



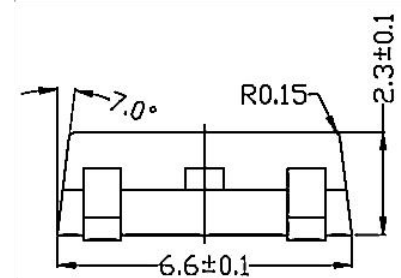
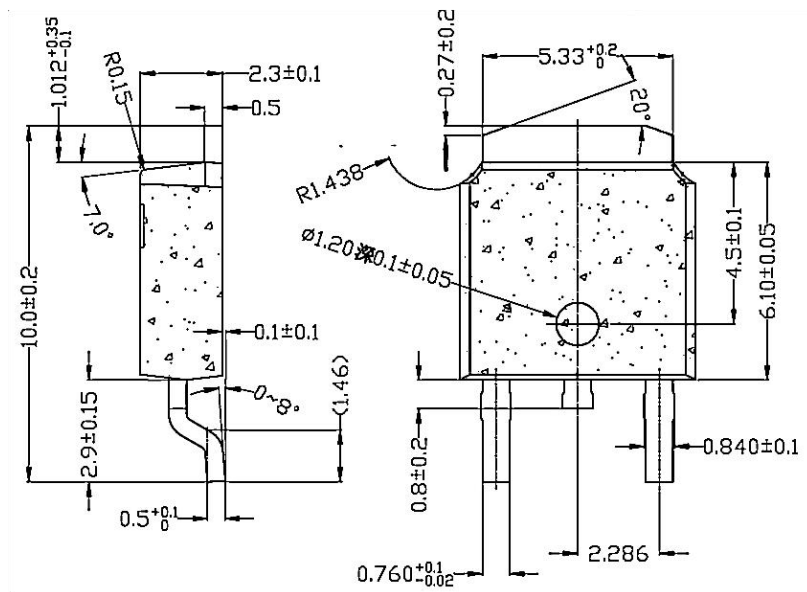
Drain-Source On-State Resistance Characteristics



Drain Current vs. Source to Drain Voltage



TO - 252 PACKAGE OUTLINE DIMENSIONS



TO - 252 PACKING INFORMATION

Package version	Reel dimensions $\Phi \times H$ (mm)	Per Reel (pcs)	Reels per box	Inner box dimensions $L \times W \times H$ (mm)	Outer box (pcs)	Outer box dimensions $L \times W \times H$ (mm)
TO-252	$\Phi 330 \times 20$	2500	2	360*340*50	25000	375*375*280