

13N50

N-CHANNEL POWER MOSFET

13A, 500V N-CHANNEL POWER MOSFET

DESCRIPTION

The 13N50 is a N-Channel enhancement mode power MOSFET. The device adopts planar stripe and uses DMOS technology to minimize and provide lower on-state resistance and faster switching speed. It can also withstand high energy pulse under the avalanche and commutation mode conditions.

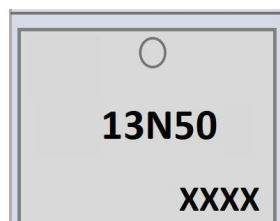
The HY13N50A is ideally suitable for high efficiency switch mode power supply, power factor correction, electronic lamp ballast based on half bridge topology.

FEATURES

* $R_{DS(ON)} < 0.48\Omega$ @ $V_{GS} = 10V$, $I_D = 6.5A$

*Avalanche energy tested

MARKING



13N50=Device Code

XXXX=Date Code

Solid Dot=Green molding compound

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	500	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	13	A
	Pulsed (Note 2)	I_{DM}	52	A
Avalanche Energy	Single Pulsed (Note 3)	EAS	972	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.1	V/ns
Power Dissipation	TO-220F	PD	35	W
Junction Temperature		T_J	+150	$^\circ C$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ C$
Junction to Ambient		θ_{JA}	62.5	$^\circ C/W$
Junction to Case		θ_{JC}	3.57	$^\circ C/W$

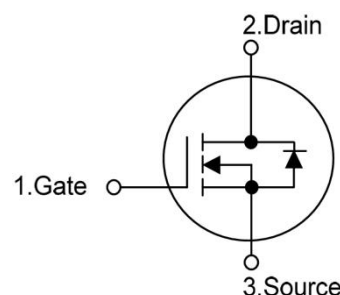
Notes:1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

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. $L=11.5mH$, $I_{AS}=13A$, $V_{DD}=50V$, $R_G=25\Omega$, Starting $T_J = 25^\circ C$.

4. $I_{SD} \leq 13A$, $di/dt \leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ C$

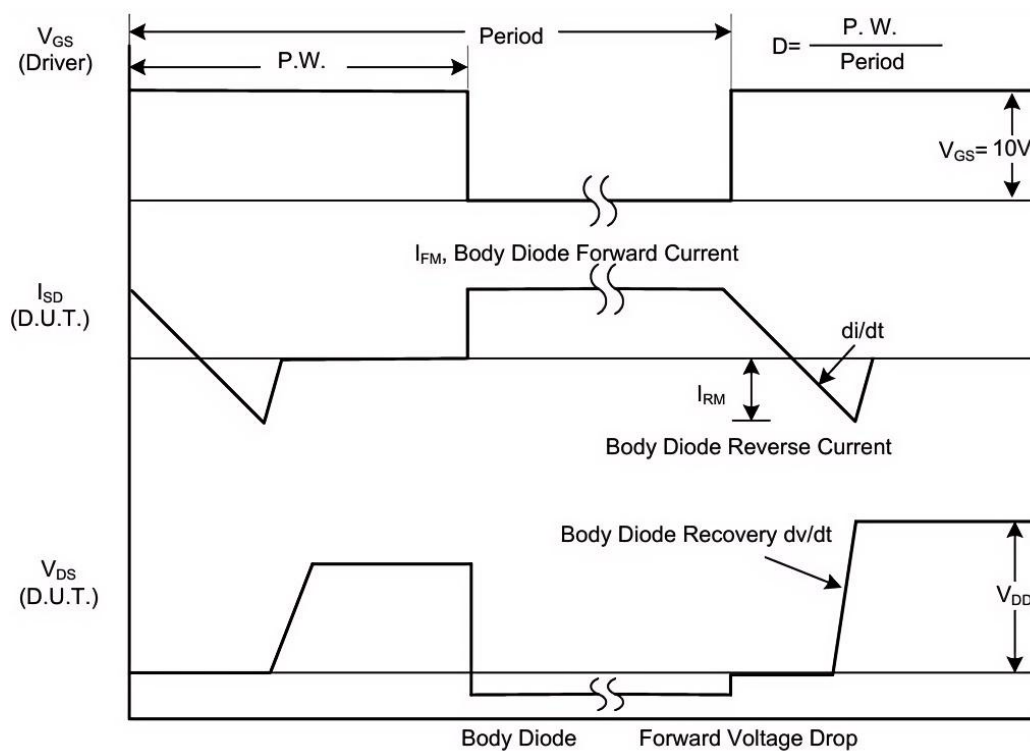


■ ELECTRICAL CHARACTERISTICS (TA=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D = 250μA	500			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} = 500V, V _{GS} = 0V			1	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} = 30V, V _{DS} = 0V			100	nA
		V _{GS} = -30V, V _{DS} = 0V			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} = V _{GS} , I _D = 250μA	2.0		4.0	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D = 6.5A			0.48	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		1920		pF
Output Capacitance	C _{OSS}			235		pF
Reverse Transfer Capacitance	C _{RSS}			36		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q _G	V _{DS} =400V, V _{GS} =10V I _D =13A, I _D =1mA (Note 1, 2)		60		nC
Gate to Source Charge	Q _{GS}			16		nC
Gate to Drain Charge	Q _{GD}			24		nC
Turn-ON Delay Time (Note 1)	t _{D(ON)}	V _{DS} =250V, V _{GS} =10V I _D =13A, R _G =25Ω (Note 1, 2)		27		nS
Rise Time	t _R			25		nS
Turn-OFF Delay Time	t _{D(OFF)}			140		nS
Fall-Time	t _F			35		nS
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				13	A
Maximum Body-Diode Pulsed Current	I _{SM}				52	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =13A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t _{rr}	I _S =13A, V _{GS} =0V		380		nS
Body Diode Reverse Recovery Charge	Q _{rr}	dI _F /dt=100A/μs		5.5		μC

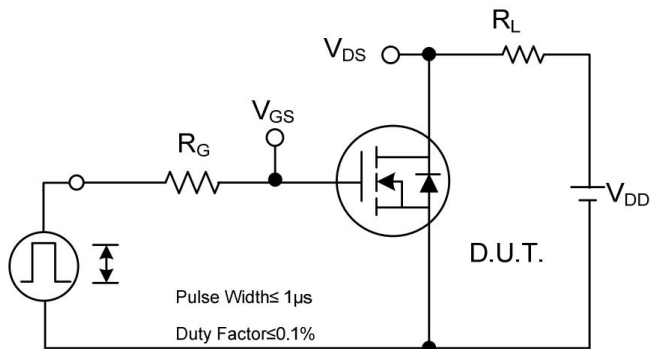
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating ambient temperature.

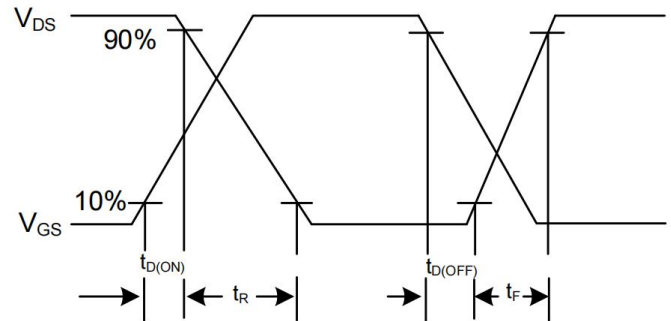
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Peak Diode Recovery dv/dt Waveforms

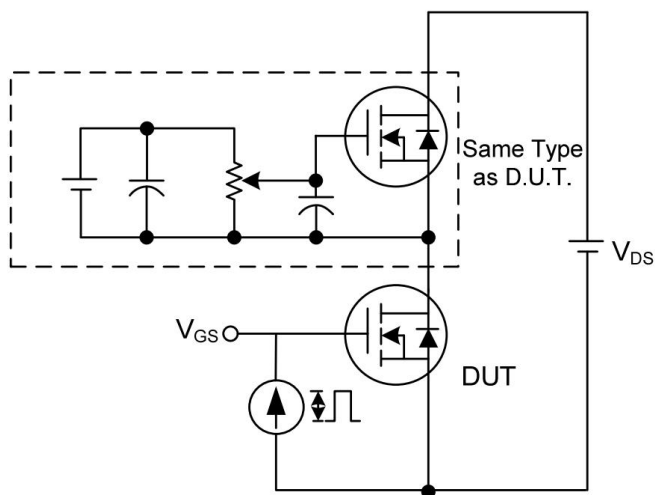
■ TEST CIRCUITS AND WAVEFORMS(Con.t)



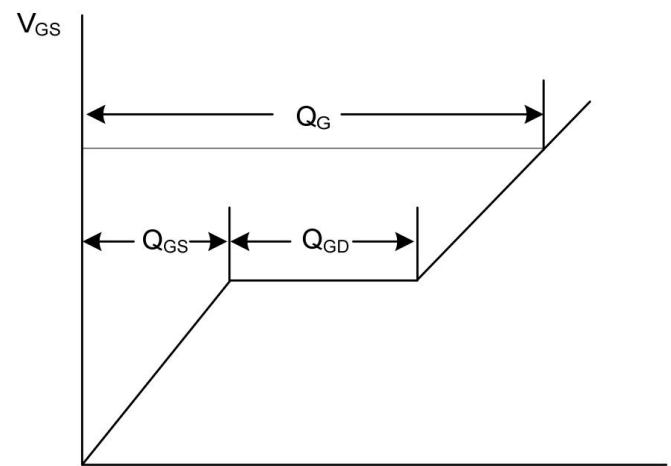
Switching Test Circuit



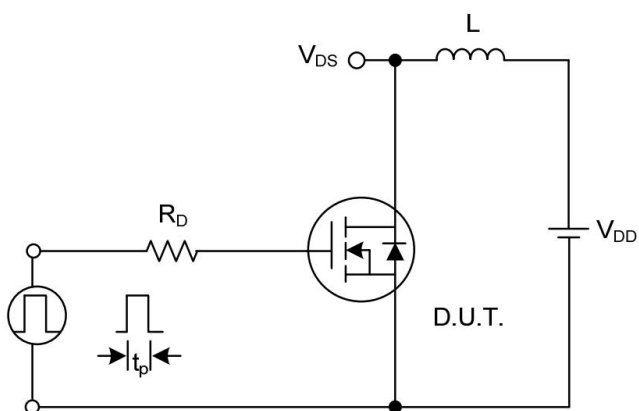
Switching Waveforms



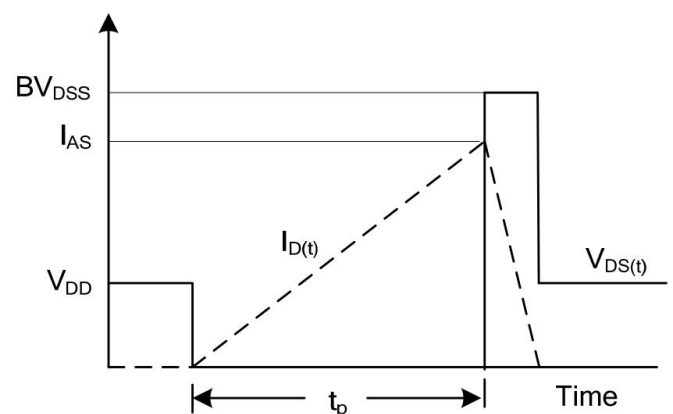
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit

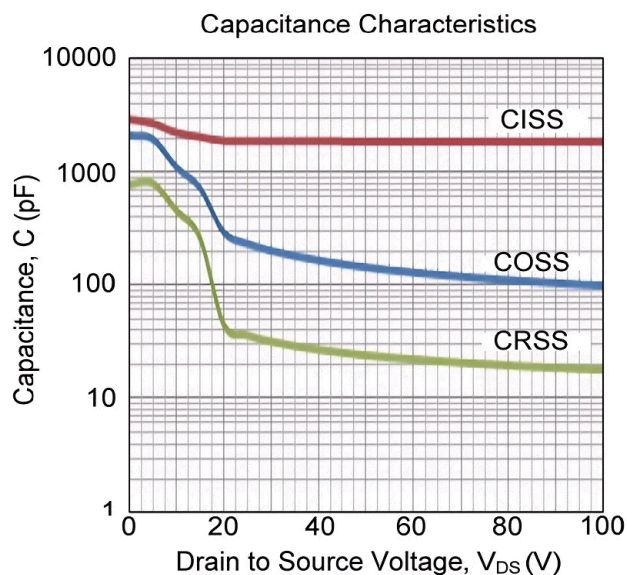
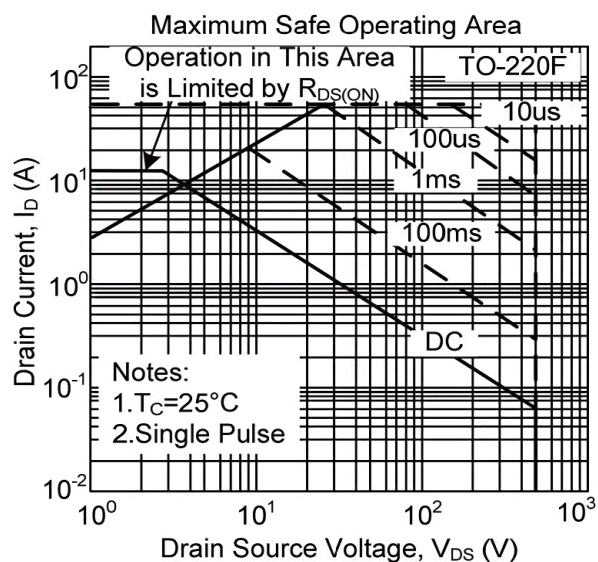
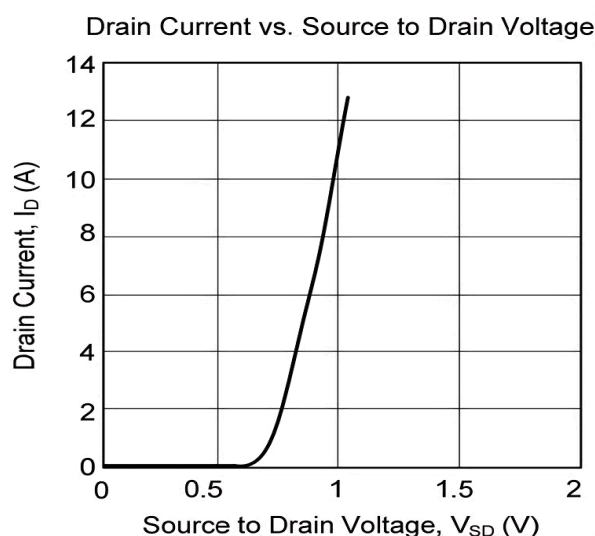
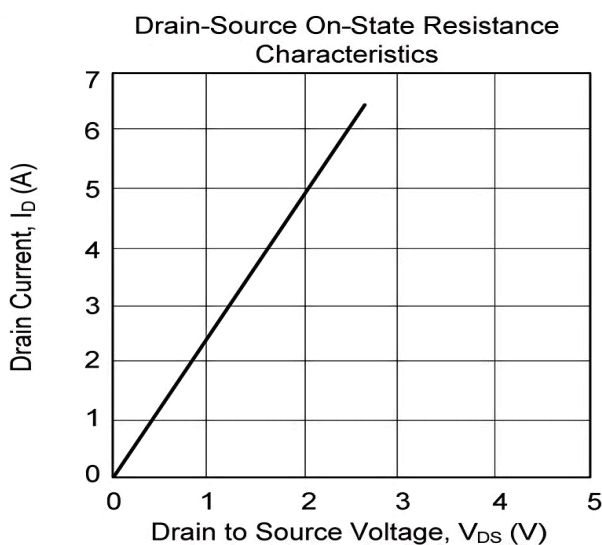
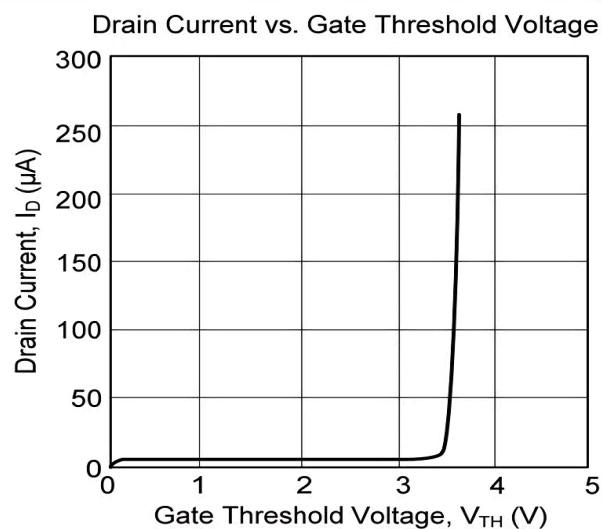
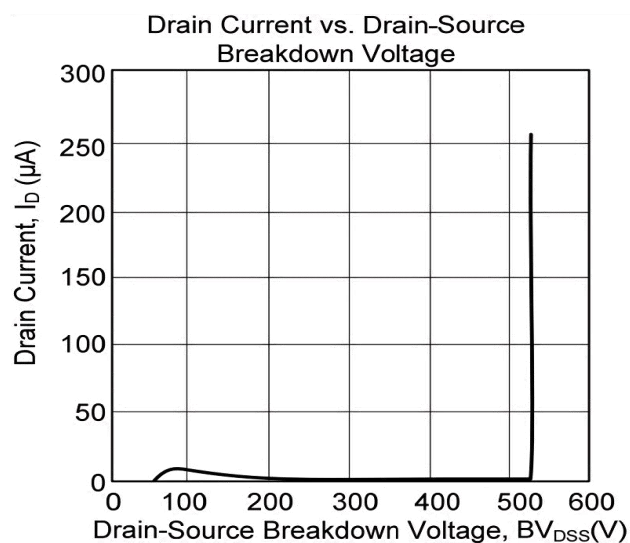


Unclamped Inductive Switching Waveforms

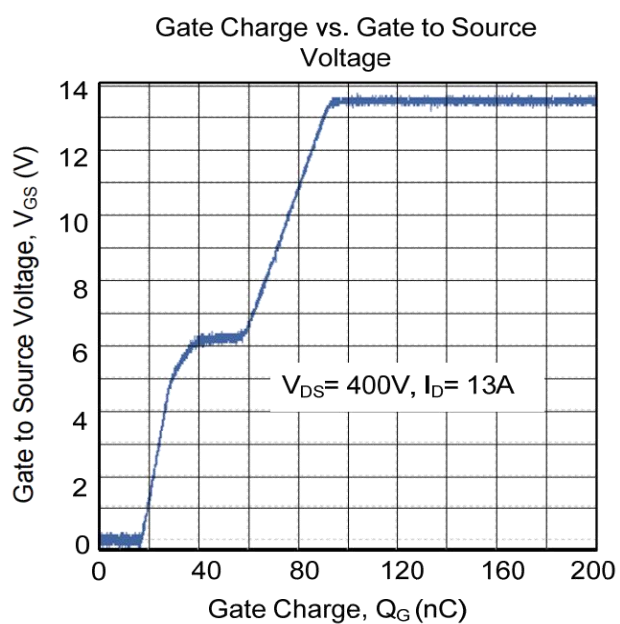
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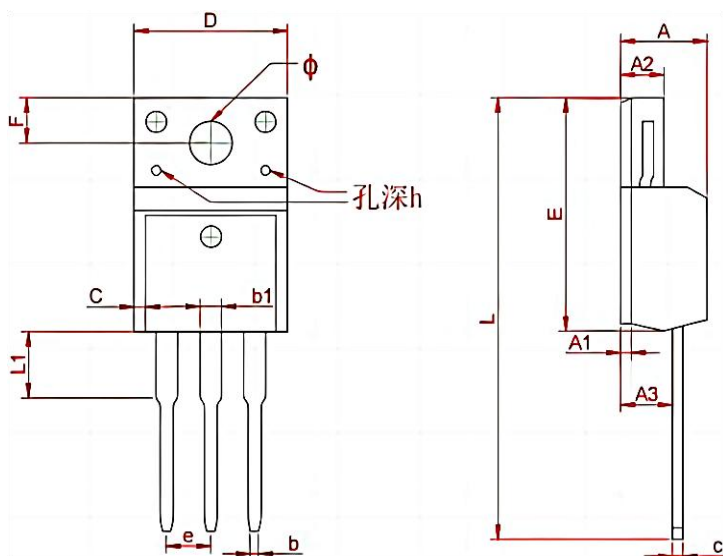
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Con.t)



TO - 220F PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters	
	Min	Max
A	4.300	4.750
A1	0.7 REF	
A2	2.300	2.850
A3	2.500	2.900
b	0.380	0.420
b1	1.220	1.280
C	1.08	1.200
c	0.480	0.520
D	10.15	10.450
E	15.700	15.950
e	2.574 TYP	
F	3.470 REF	
y	3.200 REF	
h	0.000	0.800
L	28.780	28.900
L1	2.990	3.100

TO - 220F PACKING INFORMATION

Package version	Tube dimensions LxWxH (mm)	Per Tube (pcs)	Tube per box	Inner box dimensions LxWxH (mm)	PCS/ Inner box	Outer box dimensions LxWxH(mm)	PCS/ Outer box
TO-220F	530*32*7	50	20	580*155*50	1000	602*277*188	5000