



5N50F

N-CHANNEL MOSFET

FEATURES

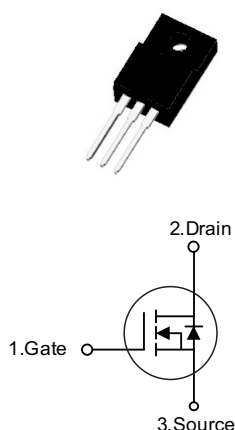
- $R_{DS(ON)} < 1.75\Omega$ @ $V_{GS} = 10V$
- Fast Switching Capability
- Avalanche Energy Specified
- Improved dv/dt Capability, High Ruggedness

APPLICATIONS

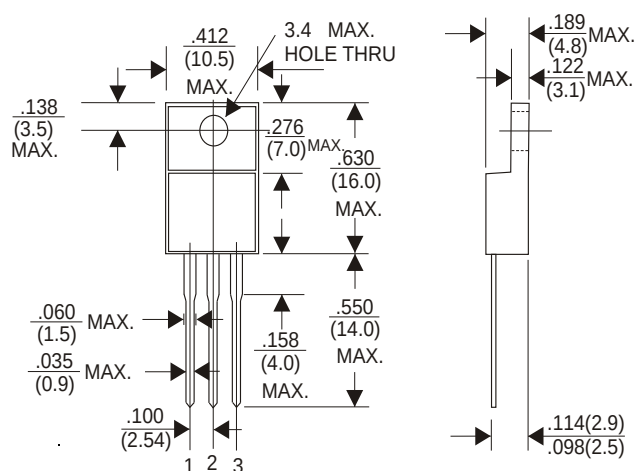
- High frequency switching mode power supply
- Electronic ballast
- LED power supply

PRODUCT CHARACTERISTICS

VDSS	500V
$R_{DS(on)max}(V_{GS}=10V)$	1.75 Ω
Qg@type	24nC
ID	5A



TO-220F (FULLY INSULATED)



ABSOLUTE MAXIMUM RATINGS ($T_c = 25^\circ C$, 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	5
	Pulsed (Note 2)	I_{DM}	20
Avalanche Current (Note 2)	I_{AR}	5	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	300
	Repetitive (Note 2)	E_{AR}	7.3
Peak Diode Recovery dv/dt (Note 4)	dv/dt	4.5	V/ns
Power Dissipation	P_D	125	W
Junction Temperature	T_J	+150	$^\circ C$
Storage Temperature	T_{STG}	-55~+150	$^\circ C$

Note: 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. $L = 21.5mH$, $I_{AS} = 5A$, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting $T_J = 25^\circ C$

4. $I_{SD} \leq 5A$, $di/dt \leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ C$

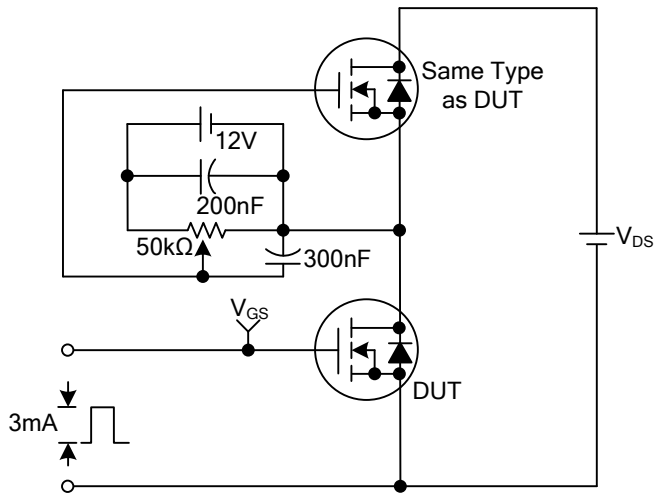
5N50F

ELECTRICAL CHARACTERISTICS ($T_c = 25^\circ\text{C}$, unless otherwise specified)

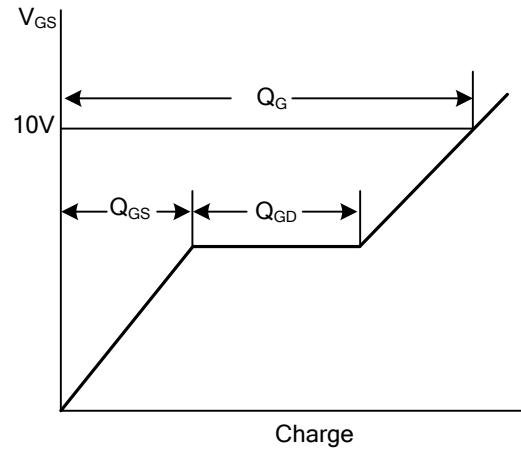
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	500			V
Breakdown Voltage Temperature Coefficient		ΔBV _{DSS} /ΔT _J	Reference to 25°C, I _D =250μA		0.5		V/°C
Drain-Source Leakage Current		I _{DSS}	V _{DS} =500V, V _{GS} =0V			1	μA
			V _{DS} =400V, T _C =125°C			10	
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =30V, V _{DS} =0V			100	nA
	Reverse		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 =2.5A		1.45	1.75	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		480	625	pF
Output Capacitance		C _{OSS}			80	105	pF
Reverse Transfer Capacitance		C _{RSS}			15	20	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{GS} =10V, V _{DS} =400V, I _D =5A (Note 1, 2)		18	24	nC
Gate to Source Charge		Q _{GS}			2.2		nC
Gate to Drain Charge		Q _{GD}			9.7		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =250V, I _D =5A, R _G =25Ω (Note 1, 2)		12	35	ns
Rise Time		t _R			46	100	ns
Turn-OFF Delay Time		t _{D(OFF)}			50	110	ns
Fall-Time		t _F			48	105	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				5	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				20	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =5A, V _{GS} =0V			1.4	V
Reverse Recovery Time		t _{rr}	I _S =5A, V _{GS} =0V,		83		ns
Reverse Recovery Charge		Q _{RR}	di _F /dt=100A/μs (Note 1)		0.25		uC

Note: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
 2. Essentially independent of operating temperature

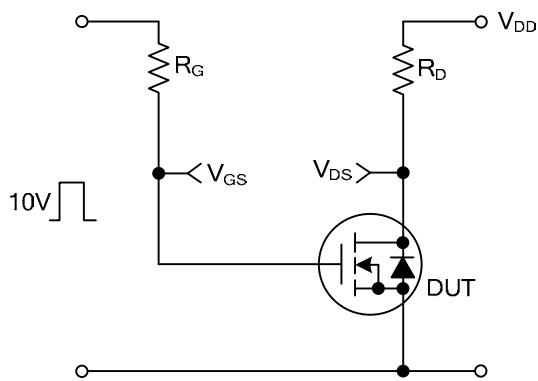
RATING AND CHARACTERISTIC CURVES (5N50F)



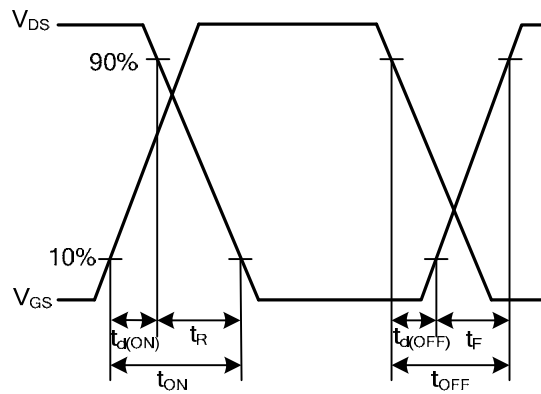
Gate Charge Test Circuit



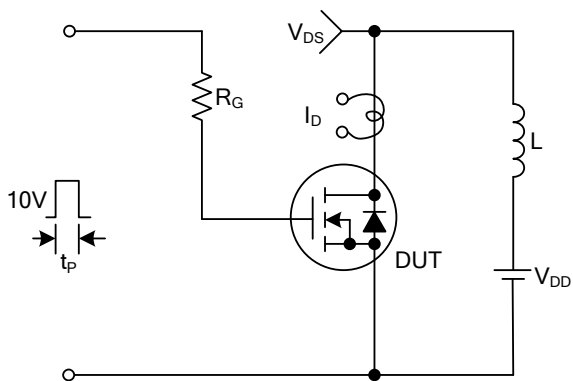
Gate Charge Waveforms



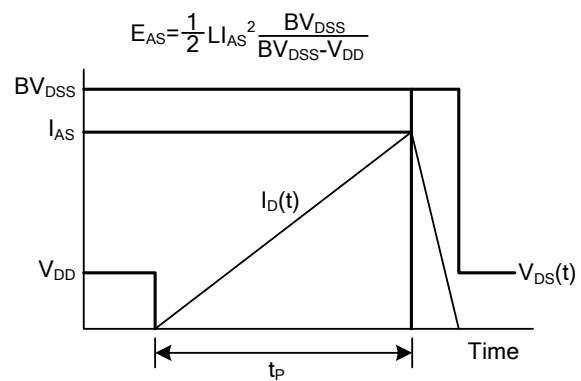
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms