GOODWORK

5N50

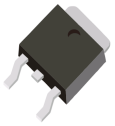
N-CHANNEL MOSFET

FEATURES

$R_{DS(ON)}$typ 1.3Ω@ V_{GS} =10V
Fast Switching Capability
Avalanche Energy Specified
Improved dv/dt Capability, High Ruggedness

APPLICATIONS

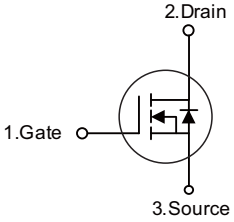
High frequency switching mode power supply
Electronic ballast
LED power supply



TO-252

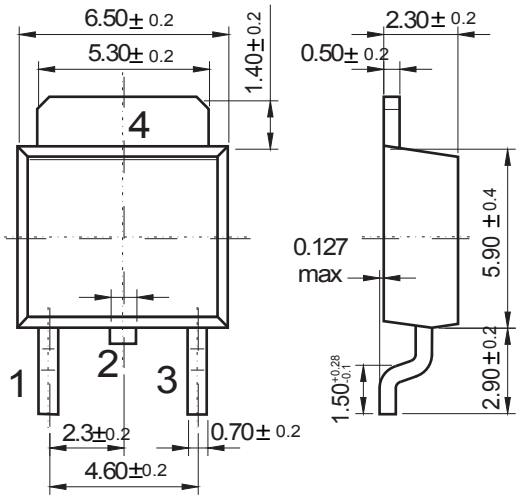
PRODUCT CHARACTERISTICS

VDSS	500V
R_{DS}(on)typ(@V_{GS}=10 V)	1.3Ω
Qg@type	24nC
ID	5A



TO-252

Unit: mm



Dimensions in inches and (millimeters)

ABSOLUTE MAXIMUM RATINGS (T_C = 25°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	A
	Pulsed (Note 2)	I_{DM}	20	A
Avalanche Current (Note 2)		I_{AR}	5	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	300	mJ
	Repetitive (Note 2)	E_{AR}	7.3	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation		P_D	125	W
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55~+150	°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 = 25Ω, Starting T_J = 25°C
4. I_{SD} ≤5A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

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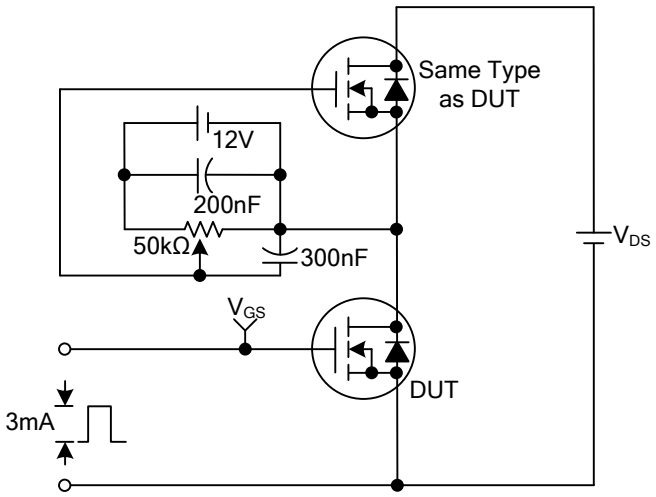
ELECTRICAL CHARACTERISTICS (T_C = 25°C, unless otherwise specified)

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		$\triangle BV_{DSS}/\triangle T_J$	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		1.3	1.55	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, dI_F/dt=100A/μs (Note 1)		83		ns
Reverse Recovery Charge		Q_{RR}			0.25		uC

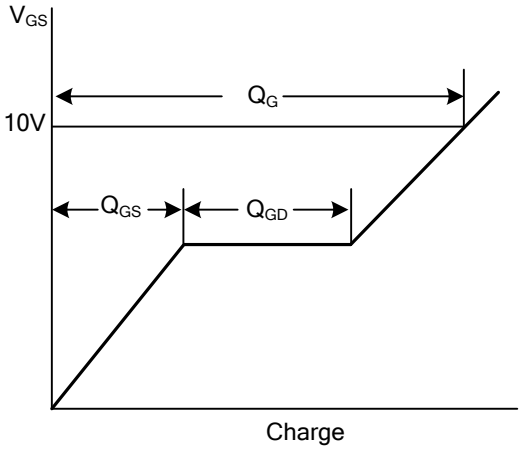
Note: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%

2. Essentially independent of operating temperature

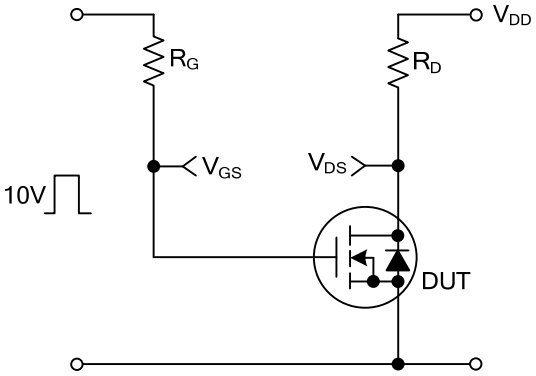
RATING AND CHARACTERISTIC CURVES (5N50)



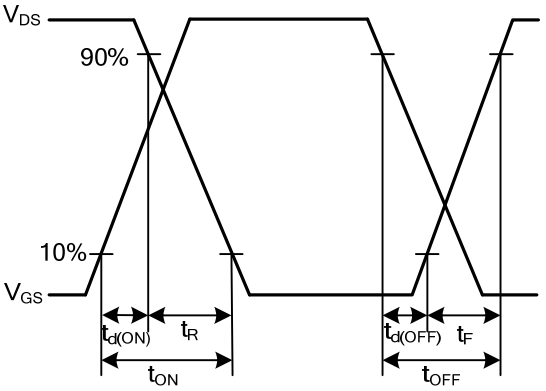
Gate Charge Test Circuit



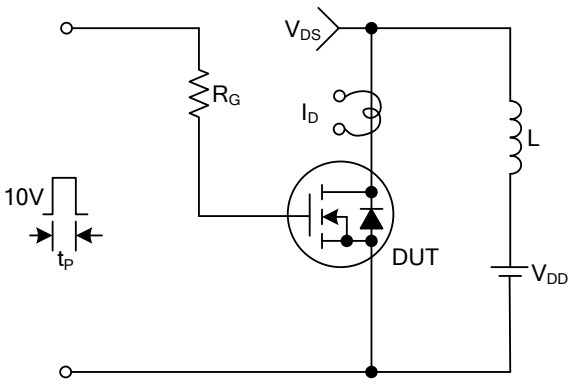
Gate Charge Waveforms



Resistive Switching Test Circuit

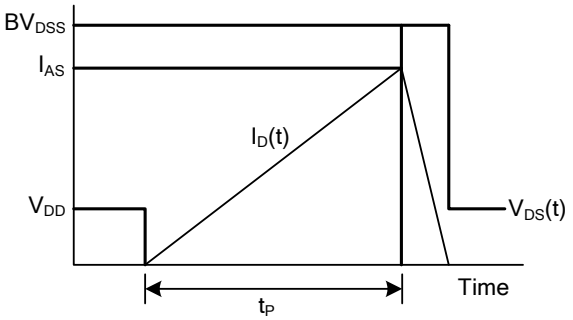


Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit

$$E_{AS}=\frac{1}{2}LI_{AS}^{2}\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$



Unclamped Inductive Switching Waveforms