

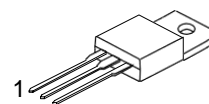
5.0A 600V N-CHANNEL POWER MOSFET

Description:

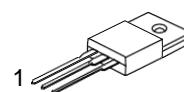
The KW5N60 is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

Features:

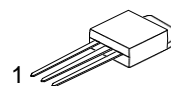
- * $V_{DS} = 600V$
- * $I_D = 5.0A$
- * $R_{DS(ON)} = 2.2\Omega @ V_{GS} = 10V$.
- * Ultra Low gate charge (typical 15nC)
- * Low reverse transfer capacitance ($C_{RSS} =$ typical 6.5 pF)
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness



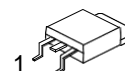
TO-220



TO-220F

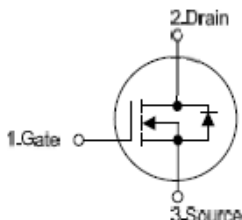


TO-251



TO-252

SYMBOL



ORDERING INFORMATION

Ordering Number	Package	Pin Assignment			Packing
		1	2	3	
KW5N60-LI	TO-220	G	D	S	Tape Box
KW5N60-BL	TO-220	G	D	S	Bulk
KW5N60F-LI	TO-220F	G	D	S	Tube
KW5N60A-LI	TO-251	G	D	S	Tube
KW5N60D-TR	TO-252	G	D	S	Tape Ree
KW5N60D-LI	TO-252	G	D	S	Tube

Note: Pin Assignment: G: Gate D: Drain S: Source

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	± 30	V
Avalanche Current (Note 2)		I_{AR}	5	A
Continuous Drain Current		I_D	5	A
Pulsed Drain Current (Note 2)		I_{DM}	20	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	210	mJ
	Repetitive (Note 2)	E_{AR}	10	
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220	P_D	100	W
	TO-220F		36	
	TO-251		54	
	TO-252		54	
Junction Temperature		T_J	+150	$^\circ\text{C}$
Operation Temperature		T_{OPR}	-55 ~ +150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

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. Pulse width limited by $T_{J(MAX)}$

3. $L = 16.8\text{mH}$, $I_{AS} = 5\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

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

THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-220F			
	TO-251			
	TO-252			
Junction to Case	TO-220	θ_{JC}	1.25	$^\circ\text{C}/\text{W}$
	TO-220F		3.47	
	TO-251		2.3	
	TO-252		2.3	

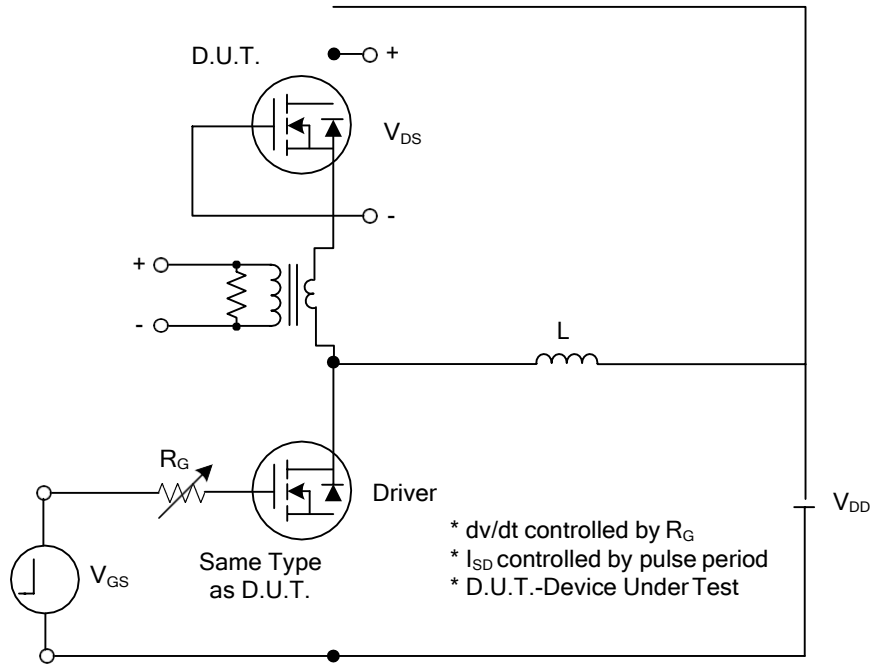
ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\text{mA}$	600			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=600V, V_{GS}=0V$			1	μA
Gate-Source Leakage Current	Forward	$V_{GS}=30V, V_{DS}=0V$			100	nA
	Reverse	$V_{GS}=-30V, V_{DS}=0V$			-100	nA
Breakdown Voltage Temperature Coefficient	$\frac{1}{V} \frac{dBV_{DSS}}{dT_J}$	$I_D=250\text{mA}$, Referenced to 25°C		0.6		$^\circ\text{C}^{-1}$
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\text{mA}$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2.5A$		1.8	2.2	$\text{m}\Omega$
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{MHz}$		515	670	pF
Output Capacitance	C_{OSS}			55	72	pF
Reverse Transfer Capacitance	C_{RSS}			6.5	8.5	pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=300V, I_D=5A,$ $R_G=25\text{m}\Omega$ (Note 1, 2)		10	30	ns
Turn-On Rise Time	t_R			42	90	ns
Turn-Off Delay Time	$t_{D(OFF)}$			38	85	ns
Turn-Off Fall Time	t_F			46	100	ns
Total Gate Charge	Q_G			15	19	nC
Gate-Source Charge	Q_{GS}	$V_{DS}=480V, I_D=5A,$ $V_{GS}=10V$ (Note 1, 2)		2.5		nC
Gate-Drain Charge	Q_{GD}			6.6		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=5A$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I_S				5	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				20	A
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_S=5A,$		300		ns
Reverse Recovery Charge	Q_{RR}	$dI_F/dt=100\text{A}/\mu\text{s}$ (Note 1)		2.2		μC

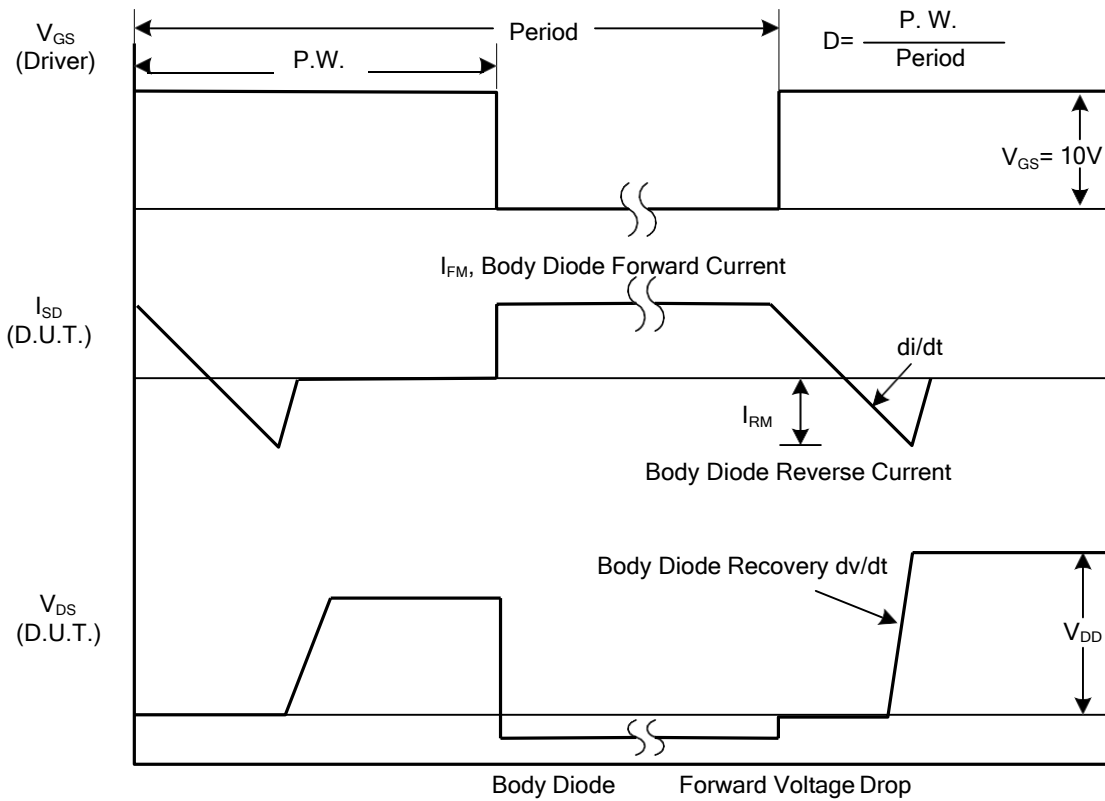
Note: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

TEST CIRCUITS AND WAVEFORMS

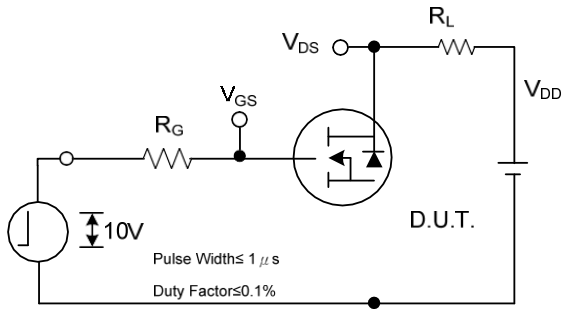


Peak Diode Recovery dv/dt Test Circuit

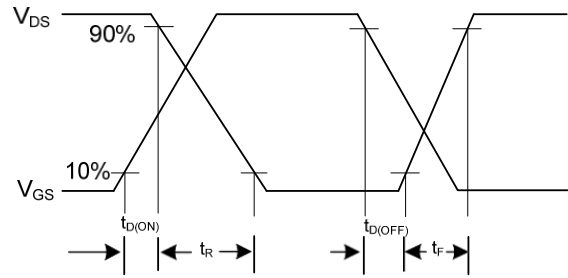


Peak Diode Recovery dv/dt Waveforms

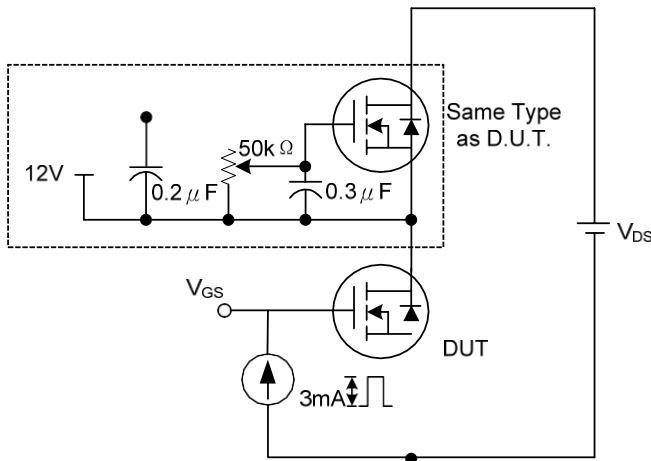
TEST CIRCUITS AND WAVEFORMS (Cont.)



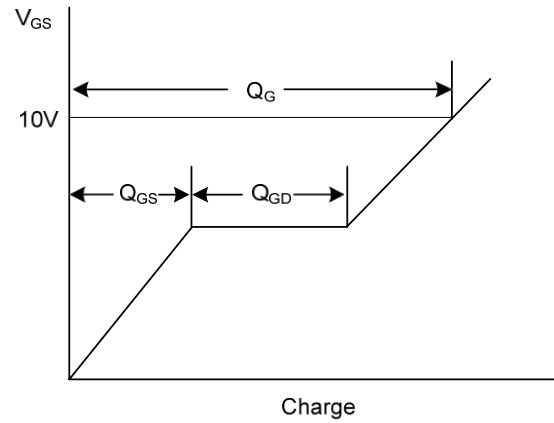
Switching Test Circuit



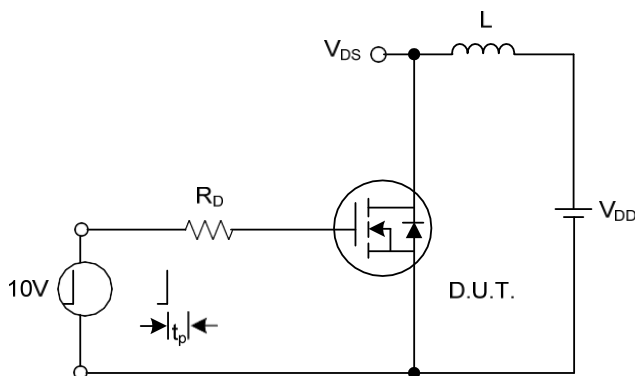
Switching Waveforms



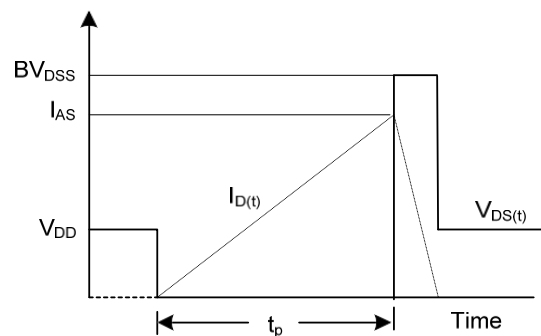
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS

