

6.2A 600V N-CHANNEL POWER MOSFET

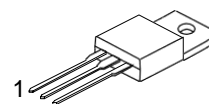
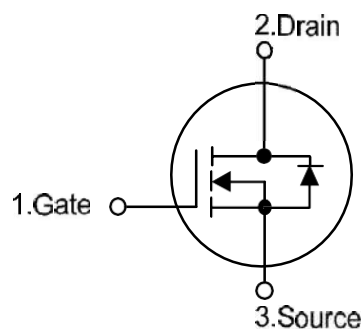
Description:

The KWNJ6N60 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 switching power supplies and adaptors.

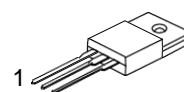
Features:

- * $V_{DS} = 600V$
- * $I_D = 6.2A$
- * $R_{DS(ON)} = 1.5 \text{ ohm}@V_{GS} = 10V$
- * Ultra low gate charge (typical 20 nC)
- * Low reverse transfer Capacitance ($CR_{SS} = \text{typical } 10pF$)
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

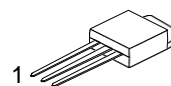
■ SYMBOL



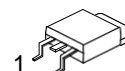
TO-220



TO-220F



TO-251



TO-252

• ORDERING INFORMATION

Ordering Number	Package	Pin Assignment			Packing
		1	2	3	
KWNJ6N60-LI	TO-220	G	D	S	Tape Box
KWNJ6N60-BL	TO-220	G	D	S	Bulk
KWNJ6N60F-LI	TO-220F	G	D	S	Tube
KWNJ6N60A-LI	TO-251	G	D	S	Tube
KWNJ6N60D-TR	TO-252	G	D	S	Tape Ree
KWNJ6N60D-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}	6.2	A	
Continuous Drain Current		I_D	6.2	A	
Pulsed Drain Current (Note 2)		I_{DM}	24.8	A	
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	6N60	440	mJ
			6N60-P	260	mJ
	Repetitive (Note 2)	E_{AR}		13	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	ns	
Power Dissipation	TO-220	P_D		125	W
	TO-220F			40	W
	TO-251			55	W
	TO-252			55	W
Junction Temperature		T_J	+150	$^\circ\text{C}$	
Operating Temperature		T_{OPR}	-55 ~ +150	$^\circ\text{C}$	
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$	

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 T_J

3. $L = 14\text{mH}$, $I_{AS} = 6\text{A}$, $V_{DD} = 90\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} = 6.2\text{A}$, $di/dt = 200\text{A}/3\text{s}$, $V_{DD} = BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

THERMAL DATA

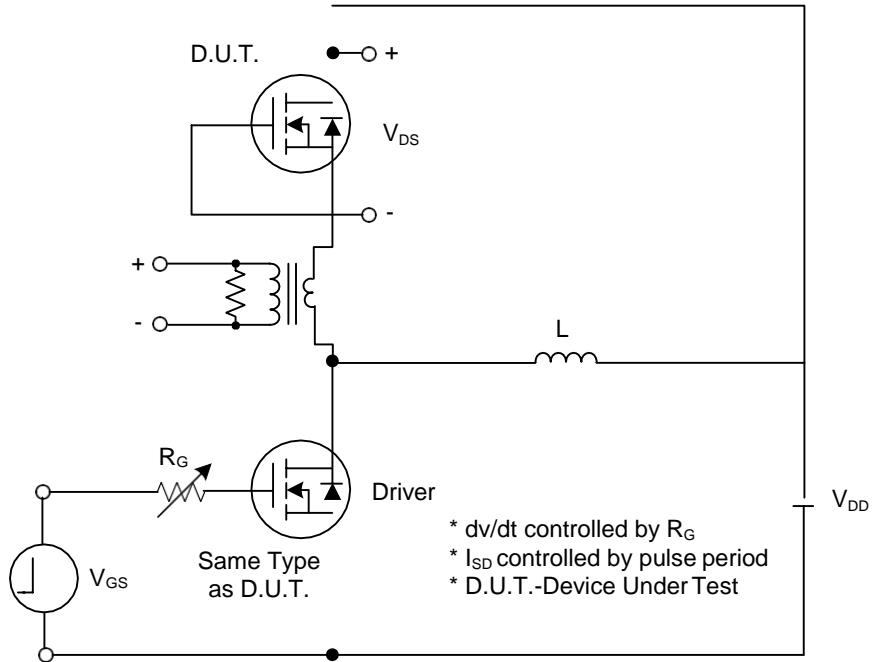
PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-220F		62.5	
	TO-251/TO-252		110	
Junction to Case	TO-220	θ_{JC}	1.0	$^\circ\text{C}/\text{W}$
	TO-220F		3.2	
	TO-251		2.27	
	TO-252		2.27	

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

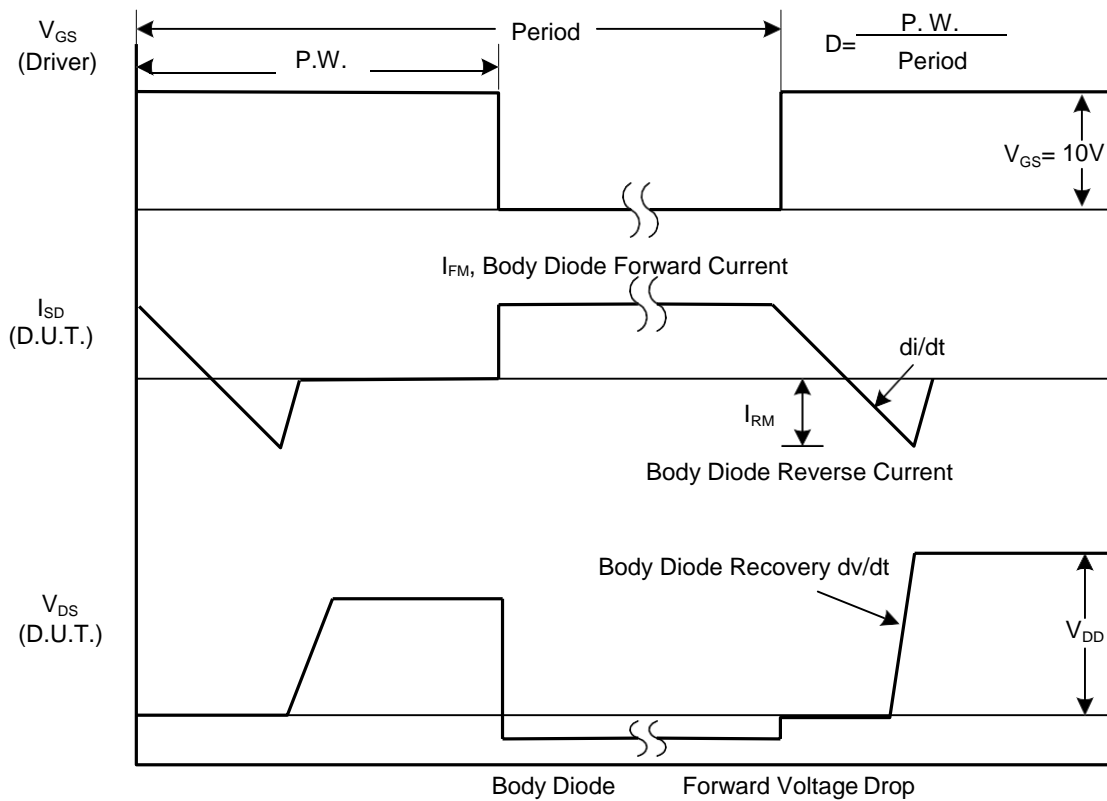
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	600			V	
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 600V, V_{GS} = 0V$			10	μA	
Gate- Source Leakage Current	Forward	$V_{GS} = 30V, V_{DS} = 0V$ $V_{GS} = -30V, V_{DS} = 0V$			100	nA	
	Reverse				-100	nA	
Breakdown Voltage Temperature Coefficient	$I_B BV_{DSS} / \Delta T_J$	$I_D=250\mu A$, Referenced to 25°C		0.53		$V/^{\circ}\text{C}$	
ON CHARACTERISTICS							
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0		4.0	V	
Static Drain-Source On-State Resistance	6N60	$V_{GS} = 10V, I_D = 3.1A$		1.0	1.5	$\text{m}\Omega$	
	6N60-P			1.0	1.5		
DYNAMIC CHARACTERISTICS							
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{ MHz}$		770	1000	pF	
Output Capacitance	C_{OSS}			95	120	pF	
Reverse Transfer Capacitance	C_{RSS}			10	13	pF	
SWITCHING CHARACTERISTICS							
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=300V, I_D=6.2A,$ $R_G=25\text{m}\Omega$ (Note 1, 2)		20	50	ns	
Turn-On Rise Time	6N60		t_r		70	150	ns
	6N60-P				60	100	ns
Turn-Off Delay Time	$t_{D(OFF)}$				40	90	ns
Turn-Off Fall Time	6N60		t_f		80	100	ns
	6N60-P				70	100	ns
Total Gate Charge	Q_G			20	25	nC	
Gate-Source Charge	Q_{GS}	$V_{DS}=480V, I_D=6.2A,$ $V_{GS}=10V$ (Note 1, 2)		4.9		nC	
Gate-Drain Charge	Q_{GD}			9.4		nC	
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0V, I_S = 6.2A$			1.4	V	
Maximum Continuous Drain-Source Diode Forward Current	I_S				6.2	A	
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				24.8	A	
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 6.2A,$ $dI_F/dt = 100\text{ A}/\mu\text{s}$ (Note 1)		290		ns	
Reverse Recovery Charge	Q_{RR}			2.35		μC	

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

TEST CIRCUITS AND WAVEFORMS

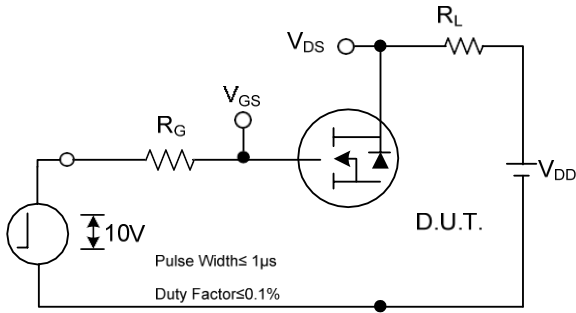


Peak Diode Recovery dv/dt Test Circuit

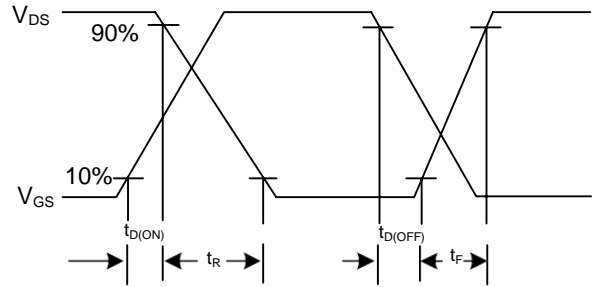


Peak Diode Recovery dv/dt Waveforms

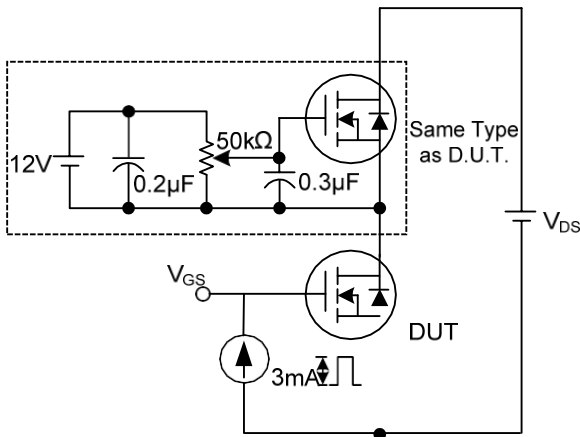
↓ **TEST CIRCUITS AND WAVEFORMS(Cont.)**



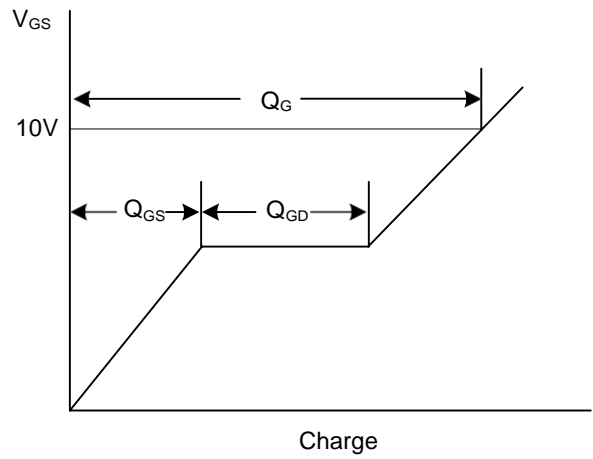
Switching Test Circuit



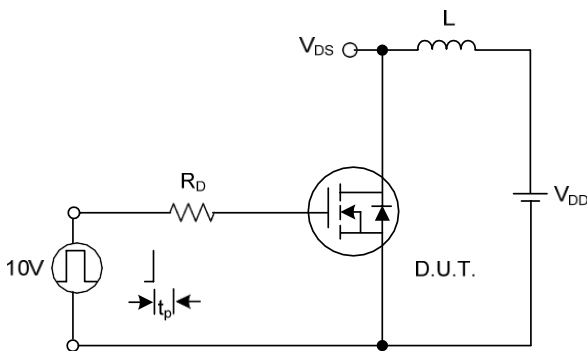
Switching Waveforms



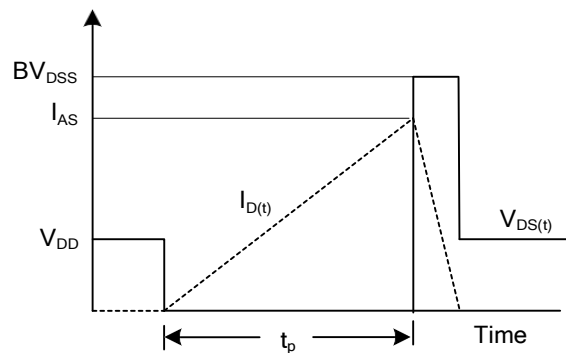
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

↓ **TYPICAL CHARACTERISTICS**

