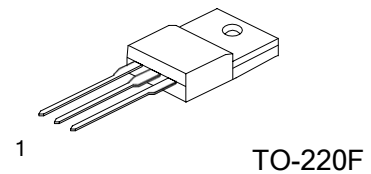
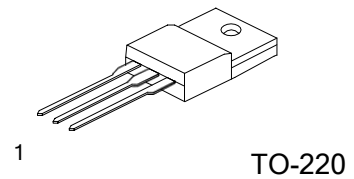


## POWER MOSFET

### Description:

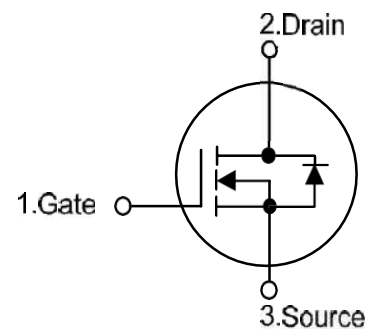
The KWNJ8N60 is a high voltage and high current power MOSFET, designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.



### Features:

- \*  $V_{DS} = 600V$
- \*  $I_D = 8.0A$
- \*  $R_{DS(ON)} = 0.9\Omega @ V_{GS} = 10V$ .
- \* Ultra Low gate charge (typical 28nC)
- \* Low reverse transfer capacitance ( $C_{RSS} =$  typical 12.0 pF)
- \* Fast switching capability
- \* Avalanche energy specified
- \* Improved dv/dt capability, high ruggedness

### SYMBOL



### ORDERING INFORMATION

Ordering Number	Package	Pin Assignment			Packing
		1	2	3	
KWNJ8N60-LI	TO-220	G	D	S	Tape Box
KWNJ8N60-BL	TO-220	G	D	S	Bulk
KWNJ8N60F-LI	TO-220F	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		$V_{GSS}$	$\pm 30$	V
Avalanche Current (Note 2)		$I_{AR}$	8.0	A
Drain Current	Continuous	$I_D$	8.0	A
	Pulsed (Note 2)	$I_{DM}$	30	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	230	mJ
	Repetitive (Note 2)	$E_{AR}$	14.7	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220	$P_D$	147	W
	TO-220F		48	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.  $L = 7.3\text{mH}$ ,  $I_{AS} = 7.5\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\ \Omega$ , Starting  $T_J = 25^\circ\text{C}$

4.  $I_{SD} \leq 7.5\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

**THERMAL DATA**

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient		$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	$\theta_{JA}$	0.85	$^\circ\text{C}/\text{W}$
	TO-220F		2.6	$^\circ\text{C}/\text{W}$

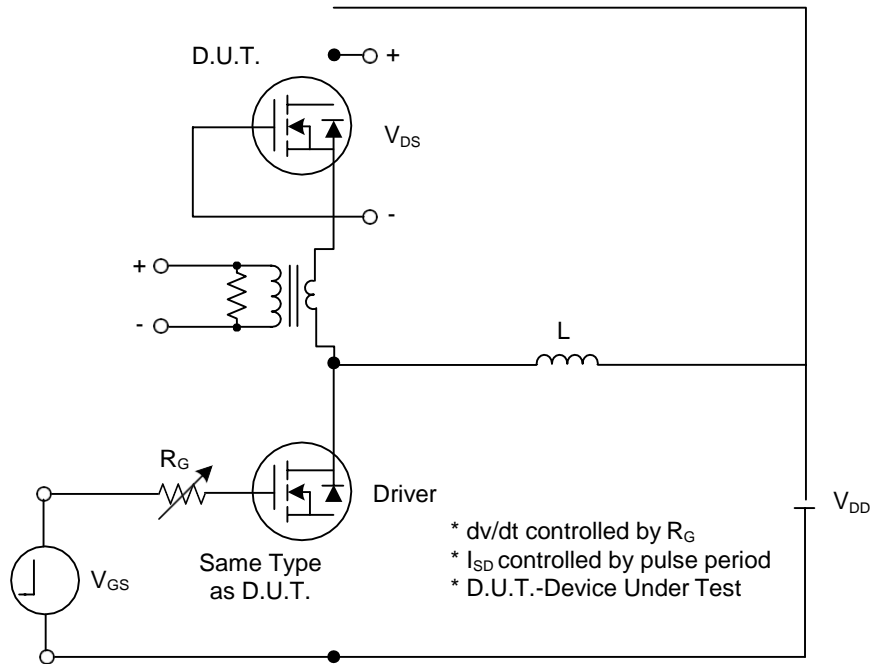
**ELECTRICAL CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	600			V	
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$			10	$\mu\text{A}$	
Gate-Source Leakage Current	Forward	$I_{GSS}$			100	nA	
	Reverse				-100	nA	
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D = 250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$		0.7		$\text{V}/^\circ\text{C}$	
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2.0		4.0	V	
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 3.75\text{ A}$		0.9	1.2	$\Omega$	
<b>DYNAMIC CHARACTERISTICS</b>							
Input Capacitance	$C_{ISS}$	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$		965	1255	pF	
Output Capacitance	$C_{OSS}$				105	135	pF
Reverse Transfer Capacitance	$C_{RSS}$				12	16	pF
<b>SWITCHING CHARACTERISTICS</b>							
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = 300\text{ V}, I_D = 7.5\text{ A},$ $R_G = 25\ \Omega$ (Note 1, 2)		16.5	45	ns	
Turn-On Rise Time	$t_R$			60.5	130	ns	
Turn-Off Delay Time	$t_{D(OFF)}$			81	170	ns	
Turn-Off Fall Time	$t_F$			64.5	140	ns	
Total Gate Charge	$Q_G$	$V_{DS} = 480\text{ V}, I_D = 7.5\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 1, 2)		28	36	nC	
Gate-Source Charge	$Q_{GS}$			4.5		nC	
Gate-Drain Charge	$Q_{GD}$			12		nC	
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>							
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 7.5\text{ A}$			1.4	V	
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				7.5	A	
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				30	A	
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0\text{ V}, I_S = 7.5\text{ A},$		365		ns	
Reverse Recovery Charge	$Q_{RR}$	$dI_F/dt = 100\text{ A}/\mu\text{s}$ (Note 2)		3.4		$\mu\text{C}$	

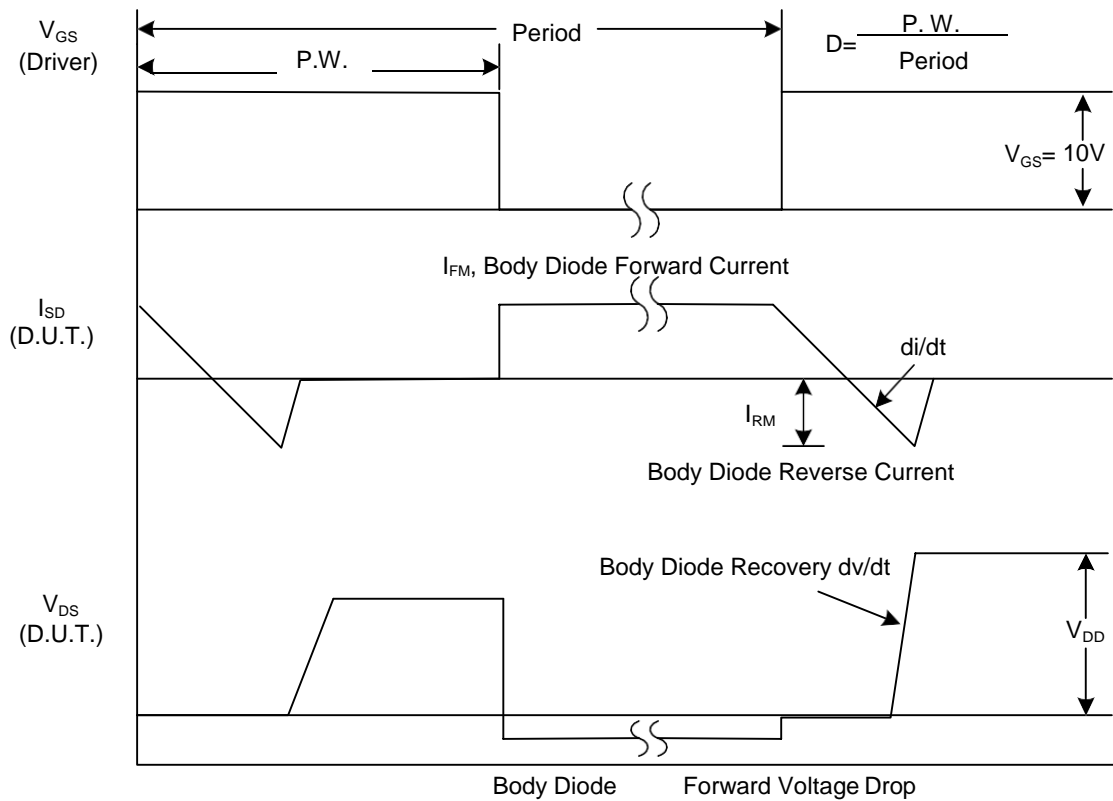
Notes: 1. Pulse Test: Pulse width  $\leq 300\ \mu\text{s}$ , Duty cycle  $\leq 2\%$

2. Essentially independent of operating temperature

**TEST CIRCUITS AND WAVEFORMS**

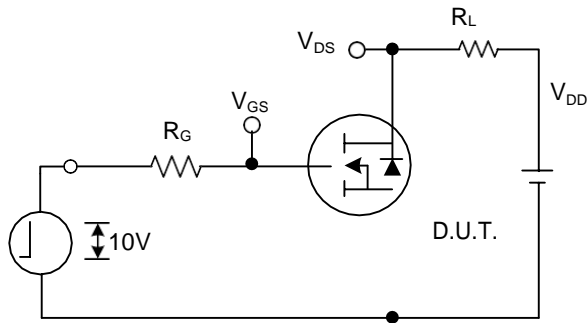


**Peak Diode Recovery  $dv/dt$  Test Circuit**

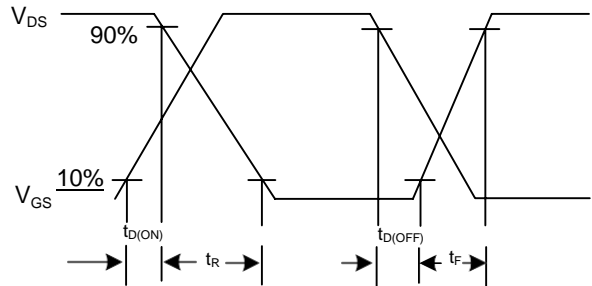


**Peak Diode Recovery  $dv/dt$  Waveforms**

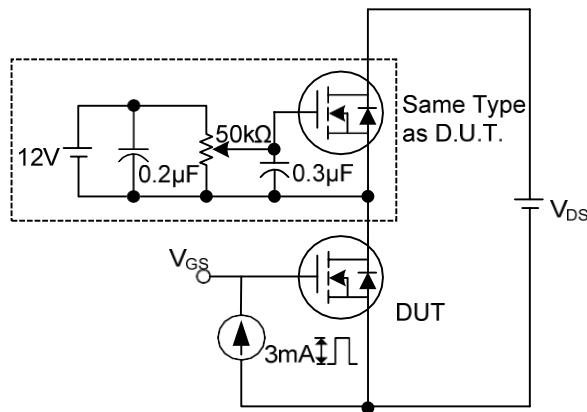
**TEST CIRCUITS AND WAVEFORMS(Cont.)**



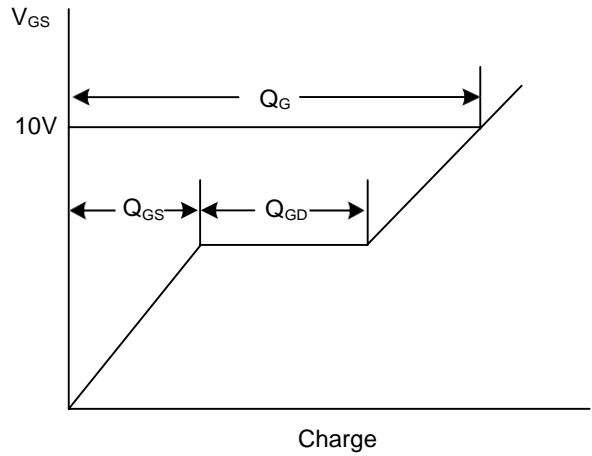
**Switching Test Circuit**



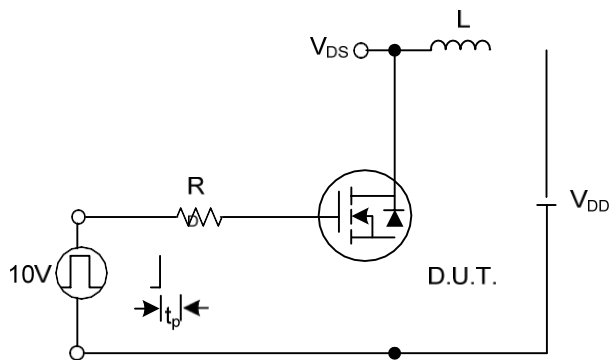
**Switching Waveforms**



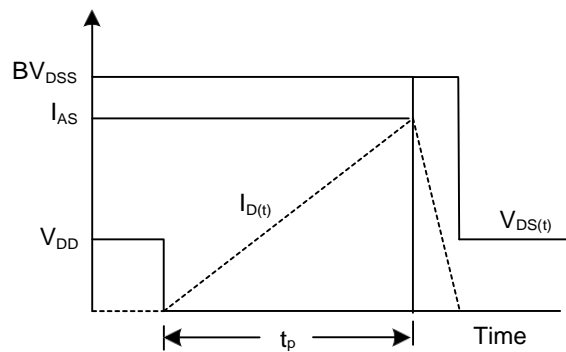
**Gate Charge Test Circuit**



**Gate Charge Waveform**

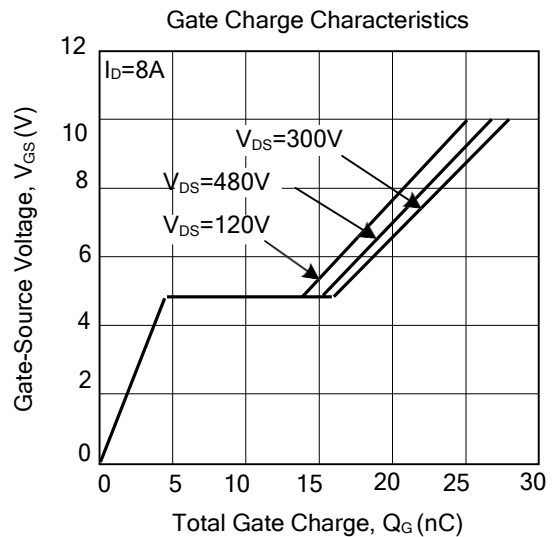
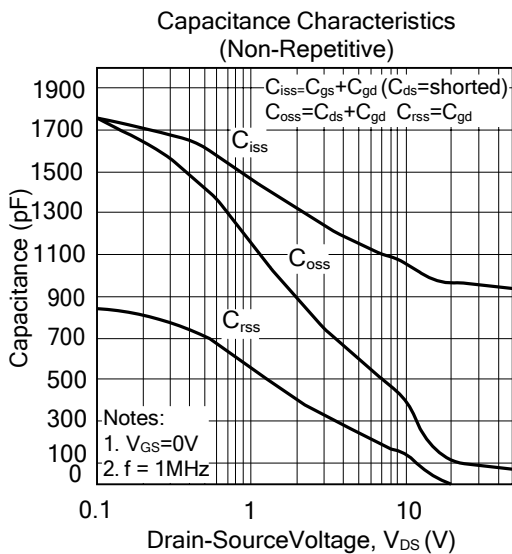
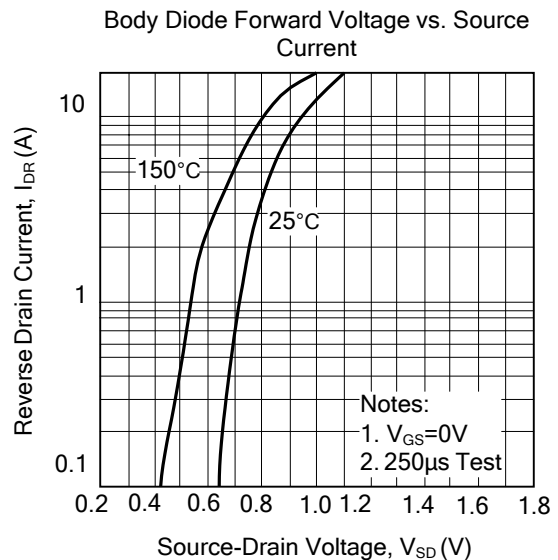
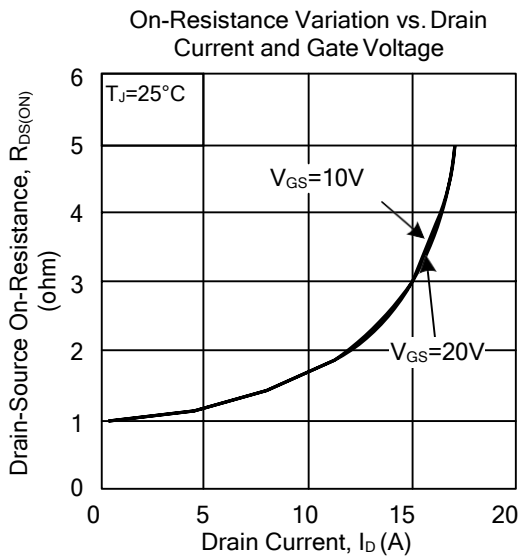
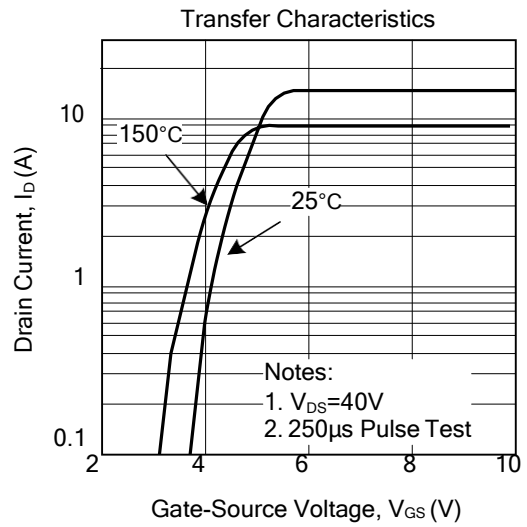
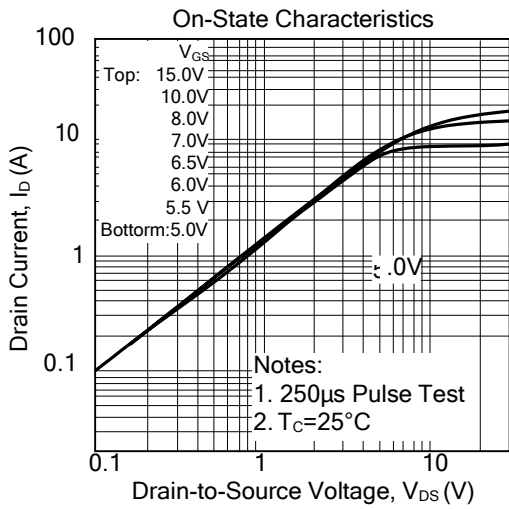


**Unclamped Inductive Switching Test Circuit**



**Unclamped Inductive Switching Waveforms**

**TYPICAL CHARACTERISTICS**



**TYPICAL CHARACTERISTICS(Cont.)**

