

6.2A 650V N-CHANNEL POWER MOSFET

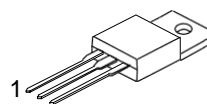
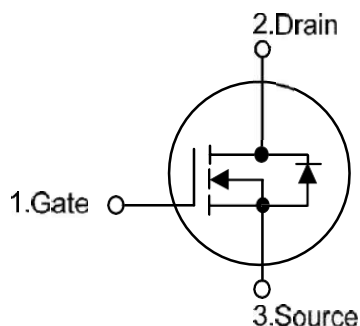
Description:

The KWNJ6N65 is a high voltage power MOSFET designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and high rugged avalanche characteristics. This power MOSFET is usually used in high speed switching applications of switching power supplies and adaptors.

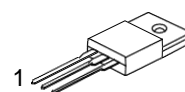
Features:

- * $V_{DS} = 650V$
- * $I_D = 6.2A$
- * $R_{DS(ON)} = 1.7 \text{ ohm}@V_{GS} = 10V$
- * Ultra low gate charge (typical 20 nC)
- * Low reverse transfer Capacitance ($CR_{SS} = \text{typical } 10pF$)
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness

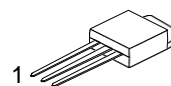
■ SYMBOL



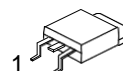
TO-220



TO-220F



TO-251



TO-252

• ORDERING INFORMATION

Ordering Number	Package	Pin Assignment			Packing
		1	2	3	
KWNJ6N65-LI	TO-220	G	D	S	Tape Box
KWNJ6N65-BL	TO-220	G	D	S	Bulk
KWNJ6N65F-LI	TO-220F	G	D	S	Tube
KWNJ6N65A-LI	TO-251	G	D	S	Tube
KWNJ6N65D-TR	TO-252	G	D	S	Tape Ree
KWNJ6N65D-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}	650	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}	6N65	440	mJ
			6N65-P	180	
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/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

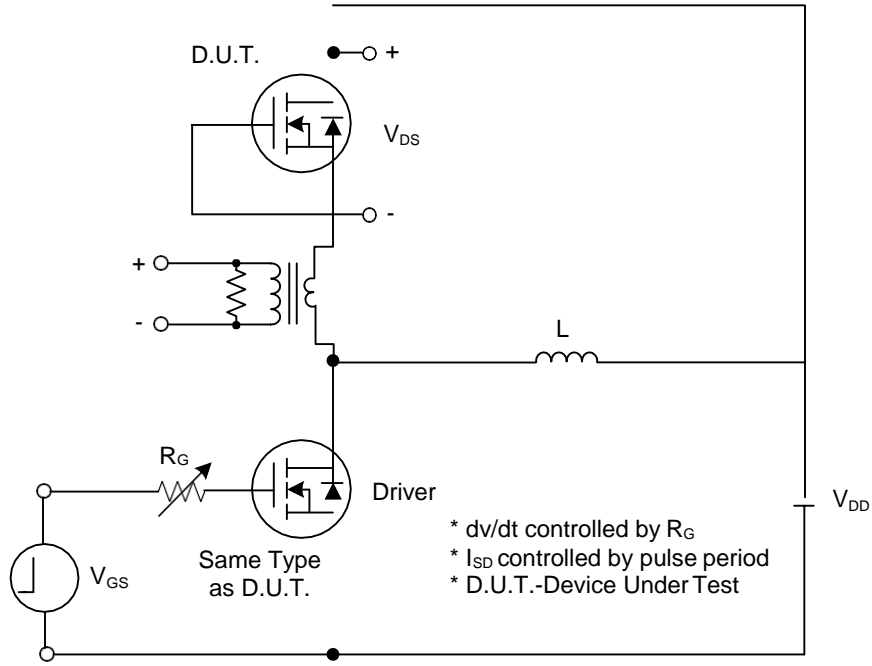
PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-220F		62.5	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.0	$^\circ\text{C}/\text{W}$
	TO-220F		3.2	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		2.27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

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

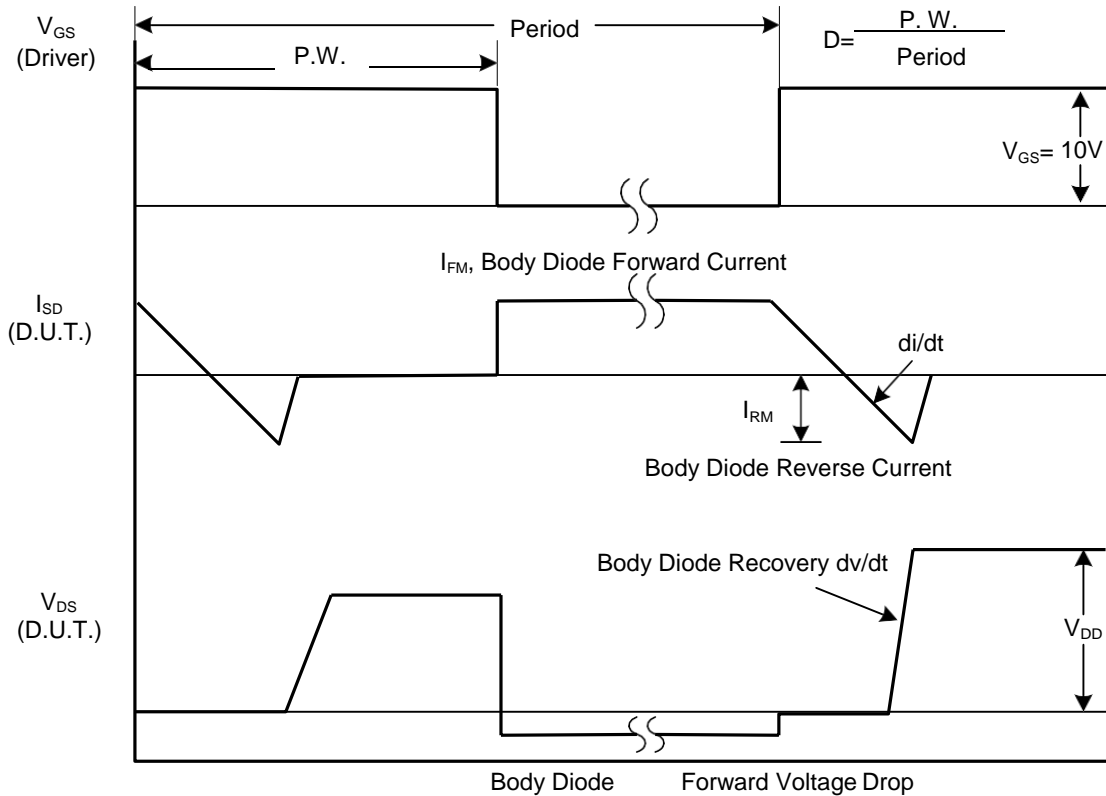
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	650			V	
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 650V, V_{GS} = 0V$			10	μA	
Gate- Source Leakage Current	Forward	$V_{GS} = 30V, V_{DS} = 0V$			100	nA	
	Reverse		$V_{GS} = -30V, V_{DS} = 0V$			-100	nA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu A$, 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	6N65	$V_{GS} = 10V, I_D = 3.1A$		1.1	1.7	Ω	
	6N65-P			1.4	2	Ω	
DYNAMIC CHARACTERISTICS							
Input Capacitance	6N65	$V_{DS}=25V, V_{GS}=0V, f=1.0\text{ MHz}$		800	1000	pF	
	6N65-P		C_{ISS}		770	1000	pF
Output Capacitance	6N65		C_{OSS}		95	120	pF
	6N65-P				70	120	pF
Reverse Transfer Capacitance	6N65		C_{RSS}		18	25	pF
	6N65-P				10	25	pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=325V, I_D=6.2A, R_G=25\Omega$ (Note 1, 2)		20	50	ns	
Turn-On Rise Time	6N65		t_R		100	120	ns
	6N65-P				70	120	ns
Turn-Off Delay Time	$t_{D(OFF)}$				40	90	ns
Turn-Off Fall Time	6N65		t_F		120	150	ns
	6N65-P				80	150	ns
Total Gate Charge	Q_G	$V_{DS}=520V, I_D=6.2A, V_{GS}=10V$ (Note 1, 2)		20	25	nC	
Gate-Source Charge	Q_{GS}			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}	$V_{GS} = 0V, I_S = 6.2A, di/dt = 100A/\mu s$ (Note 1)		290		ns	
Reverse Recovery Charge	Q_{RR}			2.35		μC	

Notes: 1. Pulse Test: Pulse width " 300 μs , Duty cycle " 2%
 2. Essentially independent of operating temperature

TEST CIRCUITS AND WAVEFORMS

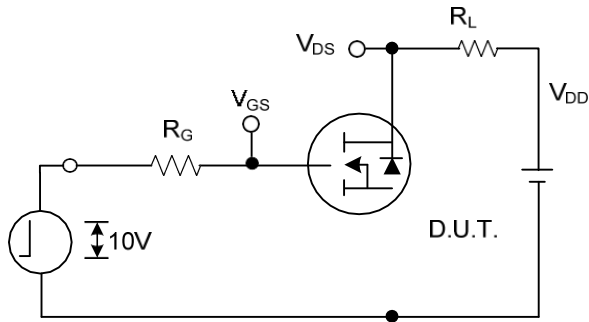


Peak Diode Recovery dv/dt Test Circuit

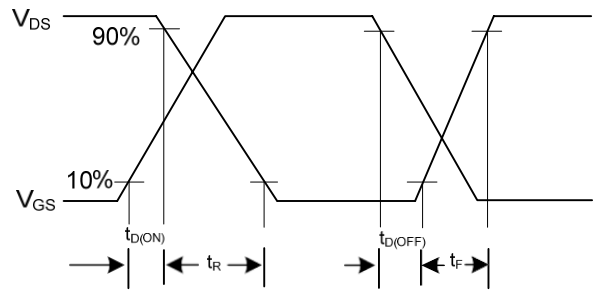


Peak Diode Recovery dv/dt Waveforms

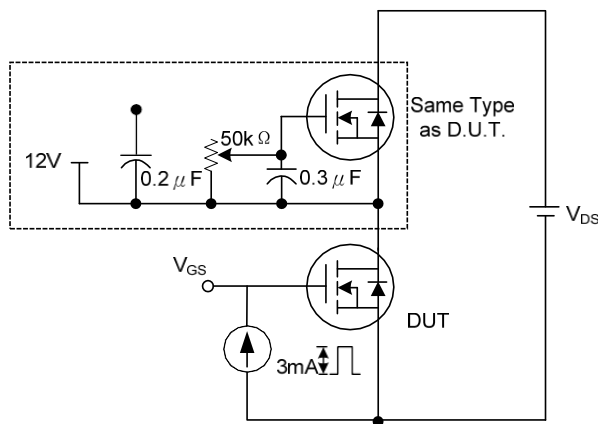
TEST CIRCUITS AND WAVEFORMS(Cont.)



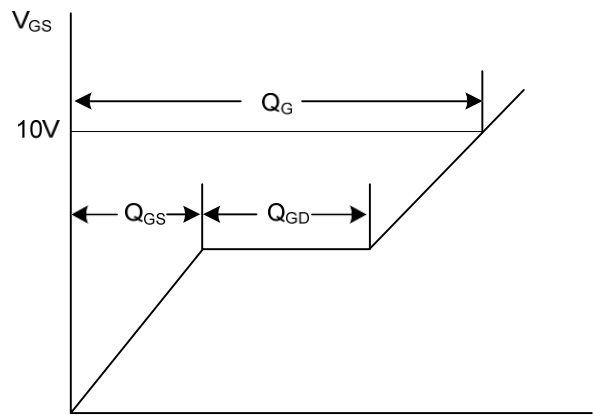
Switching Test Circuit



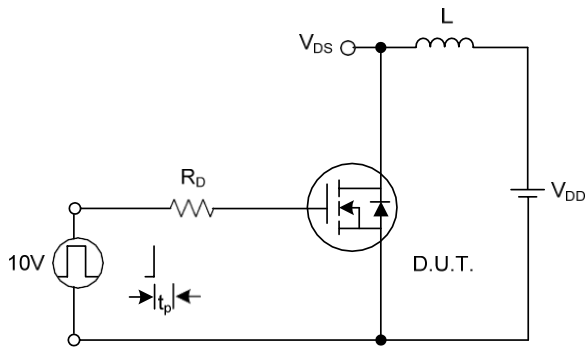
Switching Waveforms



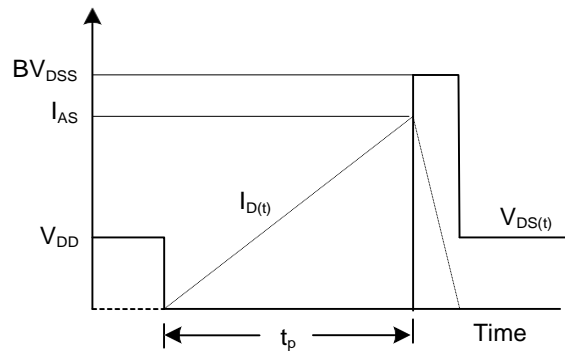
Gate Charge Test Circuit



Charge Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

↓ **TYPICAL CHARACTERISTICS**

