



7.5 Amps, 600 Volts N-CHANNEL POWER MOSFET

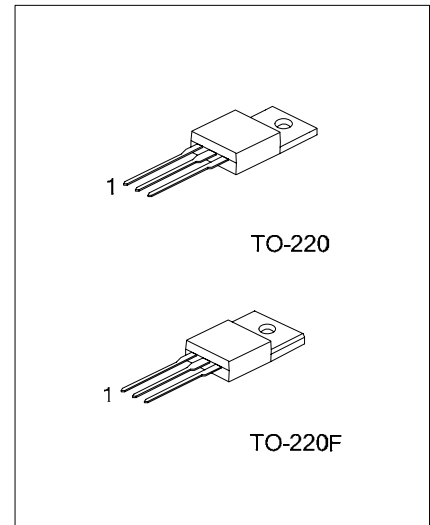
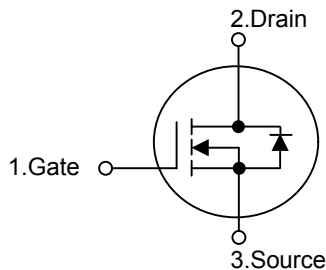
■ DESCRIPTION

The YR8N60 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

- * $R_{DS(ON)} = 1.1\Omega @ V_{GS} = 10V$
- * Ultra low gate charge (typical 28 nC)
- * Low reverse transfer capacitance ($C_{RSS} =$ typical 12.0 pF)
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

■ SYMBOL



*Pb-free plating product number: 8N60/65

■ ABSOLUTE MAXIMUM RATINGS ($T_C = 25$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage	8N60	V_{DSS}	600	V
	8N65		650	V
Gate-Source Voltage		V_{GSS}	± 20	V
Avalanche Current (Note 1)		I_{AR}	7.5	A
Continuous Drain Current	$T_C = 25^\circ C$	I_D	7.5	A
	$T_C = 100^\circ C$		4.6	A
Pulsed Drain Current (Note 1)		I_{DM}	30	A
Avalanche Energy	Single Pulsed (Note 2)	E_{AS}	230	mJ
	Repetitive (Note 1)	E_{AR}	14.7	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5	V/ns
Power Dissipation	TO-220	P_D	147	W
	TO-220F		48	W
Junction Temperature		T_J	+150	
Operating Temperature		T_{OPR}	-55 ~ +150	
Storage Temperature		T_{STG}	-55 ~ +150	

Note: 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.

■ THERMAL DATA

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

■ ELECTRICAL CHARACTERISTICS ($T_C = 25$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	8N60	BV_{DSS}	$V_{GS} = 0 V, I_D = 250 \mu A$	600			V
	8N65			650			V
Drain-Source Leakage Current		I_{DSS}	$V_{DS} = 600 V, V_{GS} = 0 V$			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	$V_{GS} = 20 V, V_{DS} = 0 V$			100	nA
	Reverse		$V_{GS} = -20 V, V_{DS} = 0 V$			-100	nA
Breakdown Voltage Temperature Coefficient		BV_{DSS}/T_J	$I_D = 250 \mu A, \text{Referenced to } 25^\circ C$		0.7		V/
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		$R_{DS(ON)}$	$V_{GS} = 10 V, I_D = 3.75 A$		0.9	1.1	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance	C_{ISS}	$V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz$			965	1255	pF
Output Capacitance	C_{OSS}				105	135	pF
Reverse Transfer Capacitance	C_{RSS}				12	16	pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = 300V, I_D = 7.5 A, R_G = 25\Omega$ (Note 4, 5)			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	$V_{DS} = 480V, I_D = 7.5A, V_{GS} = 10 V$ (Note 4, 5)			28	36	nC
Gate-Source Charge	Q_{GS}				4.5		nC
Gate-Drain Charge	Q_{GD}				12		nC

■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
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 4)		3.4		μC

- Notes: 1. Repetitive Rating : Pulse width limited by T_J
 2. $L = 7.3\text{mH}, I_{AS} = 7.5\text{A}, V_{DD} = 50\text{V}, R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$
 3. $I_{SD} \leq 7.5\text{A}, di/dt \leq 200\text{A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
 4. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
 5. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

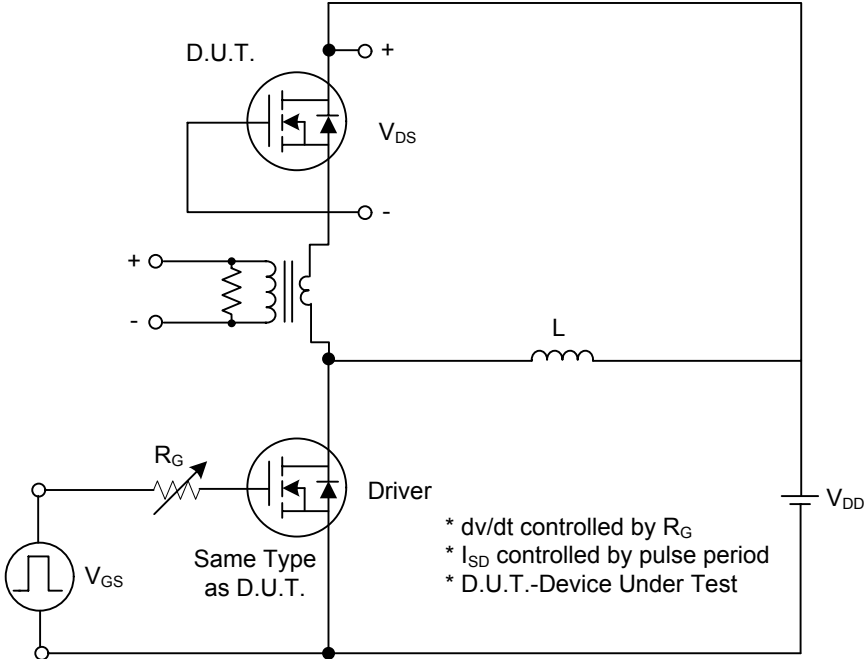


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

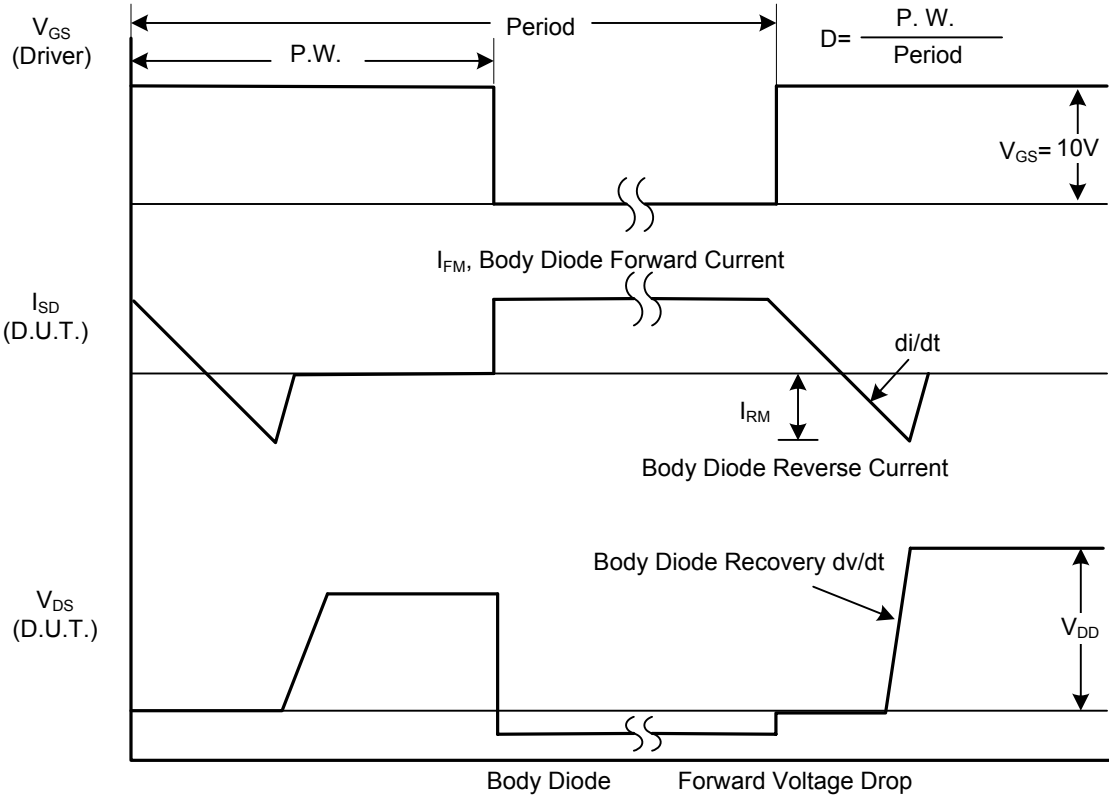


Fig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

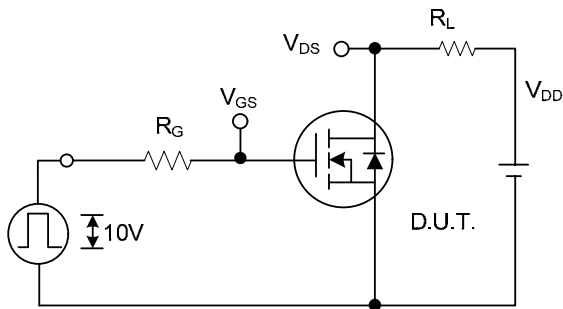


Fig. 2A Switching Test Circuit

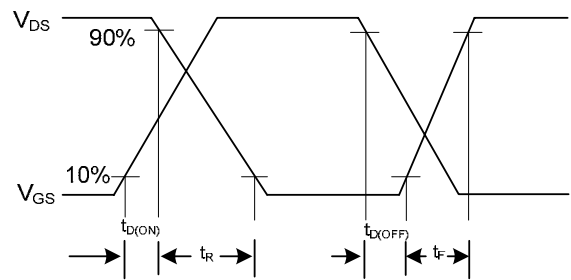


Fig. 2B Switching Waveforms

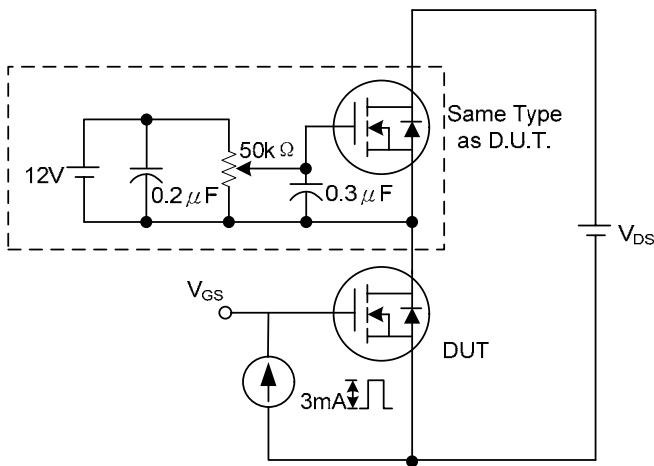


Fig. 3A Gate Charge Test Circuit

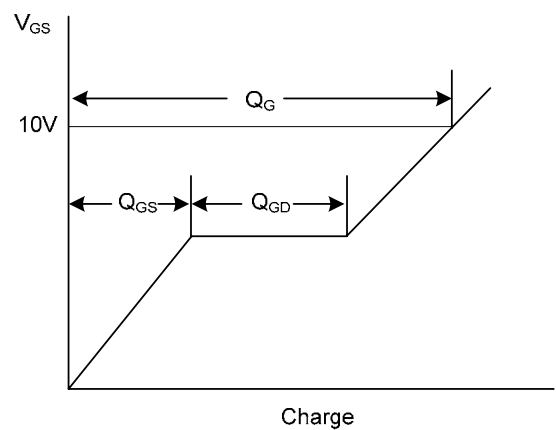


Fig. 3B Gate Charge Waveform

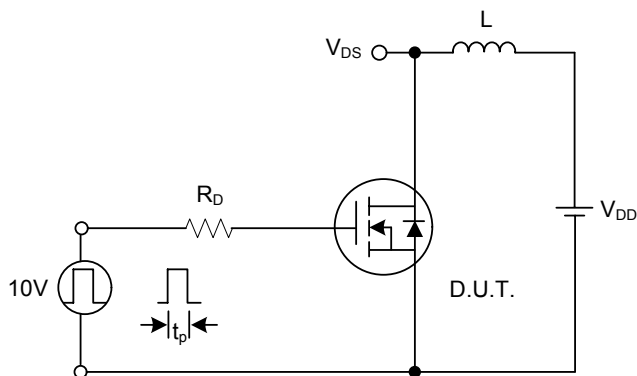


Fig. 4A Unclamped Inductive Switching Test Circuit

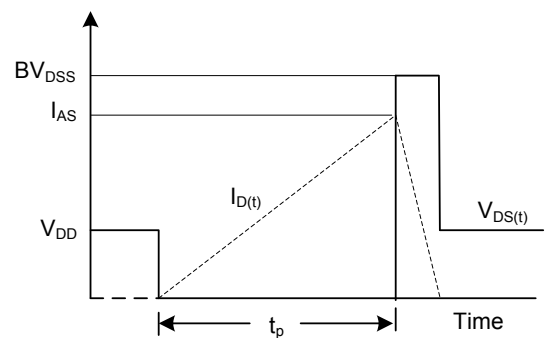
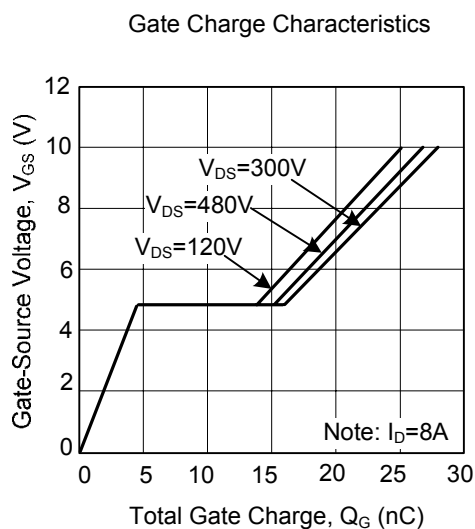
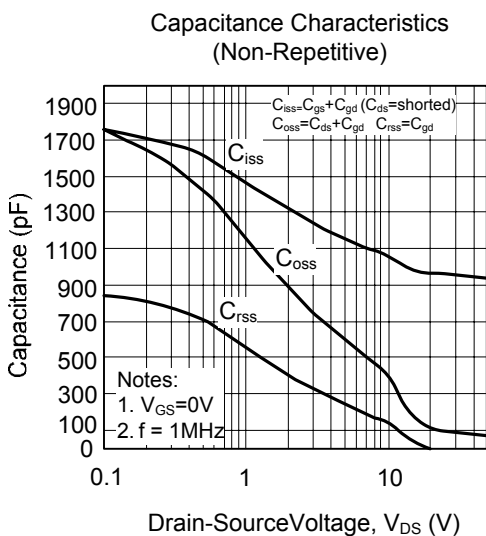
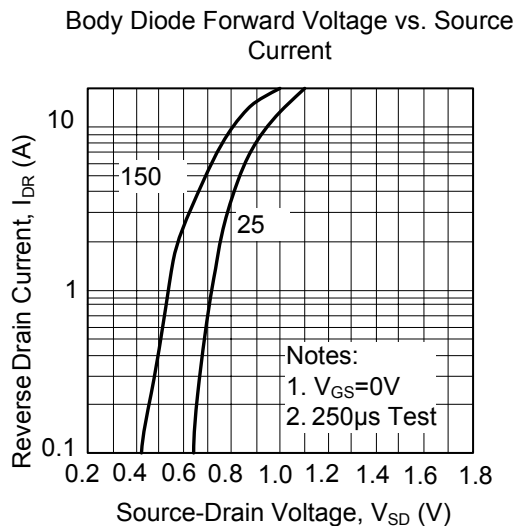
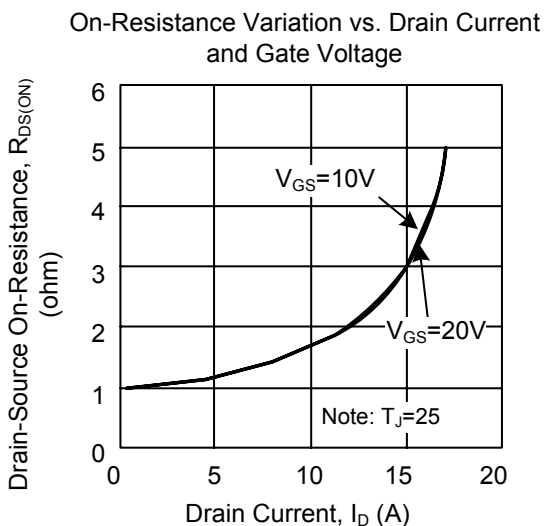
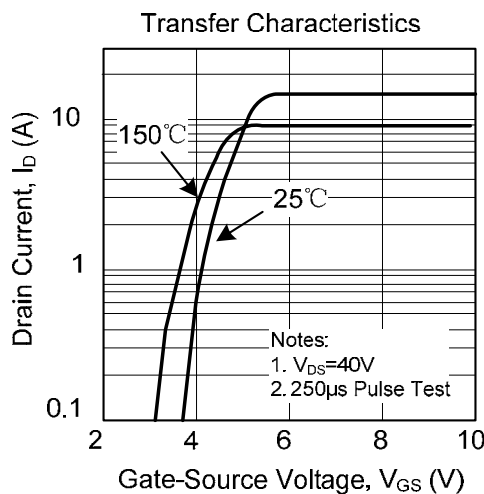
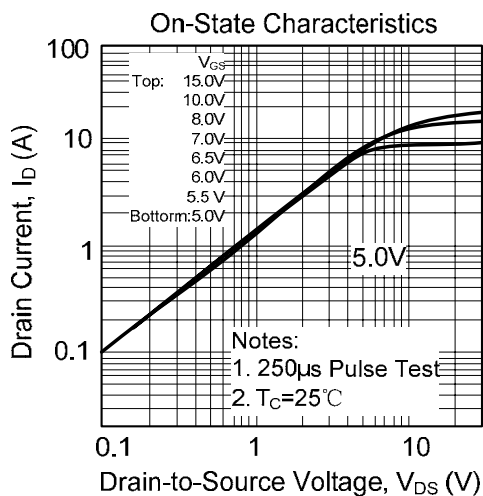


Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)

