



## 7.5 Amps, 650 Volts N-CHANNEL POWER MOSFET

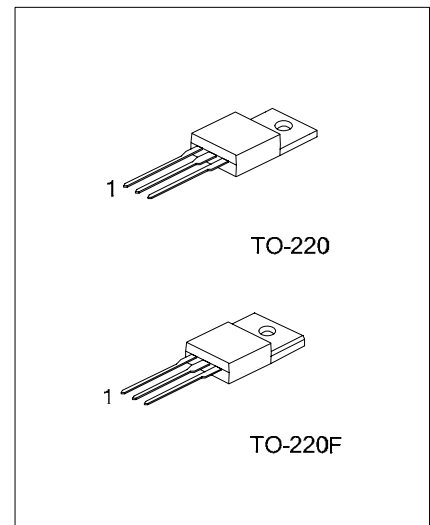
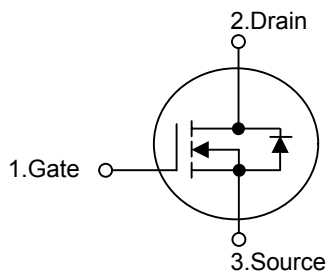
### ■ DESCRIPTION

The YR8N65 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

- \*  $R_{DS(ON)} = 1.2\Omega @ V_{GS} = 10\text{ V}$
- \* Ultra low gate charge ( typical 28 nC )
- \* Low reverse transfer capacitance (  $C_{RSS} = \text{typical } 12.0\text{ pF}$  )
- \* Fast switching capability
- \* Avalanche energy specified
- \* Improved dv/dt capability, high ruggedness

### ■ SYMBOL



\*Pb-free plating product number: 8N65

■ 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		$V_{GSS}$	$\pm 20$	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	$\theta_{JA}$	62.5	$^\circ C/W$
	TO-220F		62.5	$^\circ C/W$
Junction-to-Case	TO-220	$\theta_{JC}$	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
<b>OFF CHARACTERISTICS</b>							
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	$\mu A$
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/
<b>ON CHARACTERISTICS</b>							
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		$R_{DS(ON)}$	$V_{GS} = 10 V, I_D = 3.75 A$		1.0	1.2	$\Omega$
<b>DYNAMIC CHARACTERISTICS</b>							
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
<b>SWITCHING CHARACTERISTICS</b>							
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
<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 4)		3.4		$\mu\text{C}$

- 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

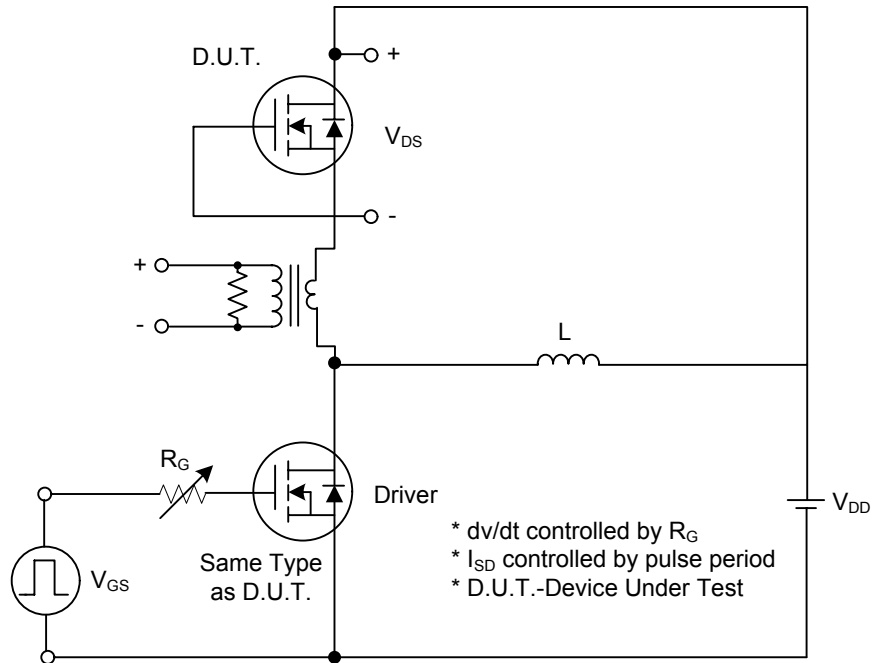


Fig. 1A Peak Diode Recovery  $dv/dt$  Test Circuit

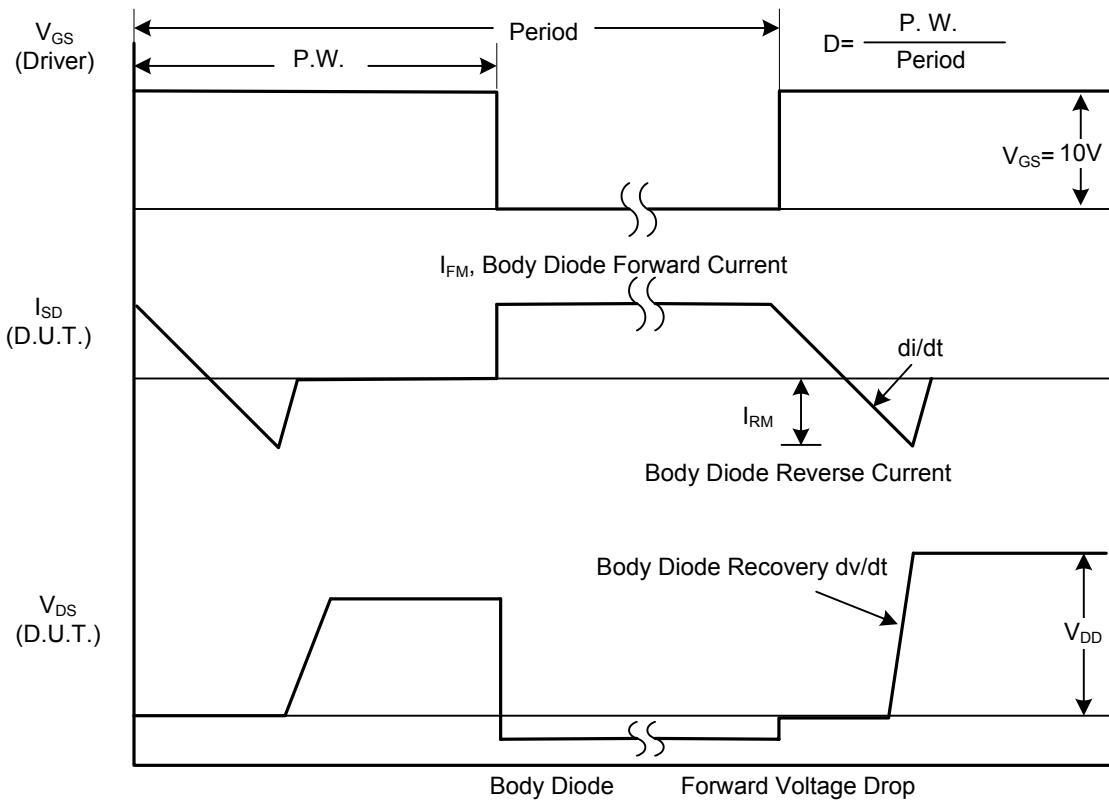


Fig. 1B Peak Diode Recovery  $dv/dt$  Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

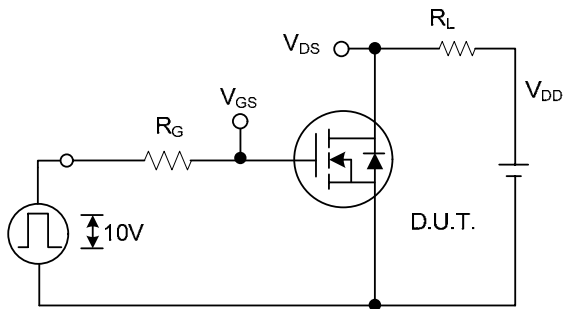


Fig. 2A Switching Test Circuit

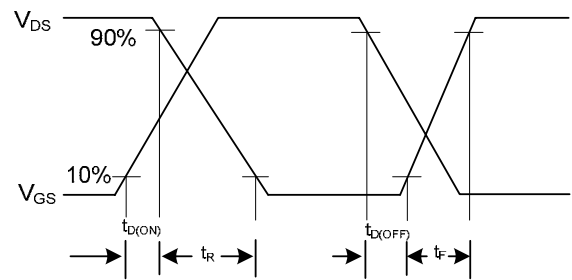


Fig. 2B Switching Waveforms

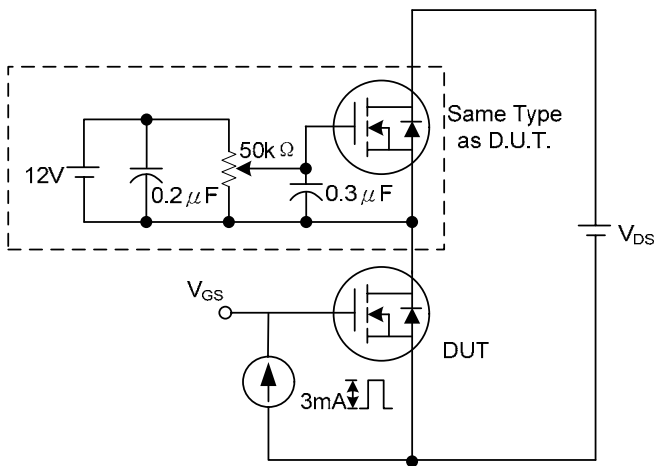


Fig. 3A Gate Charge Test Circuit

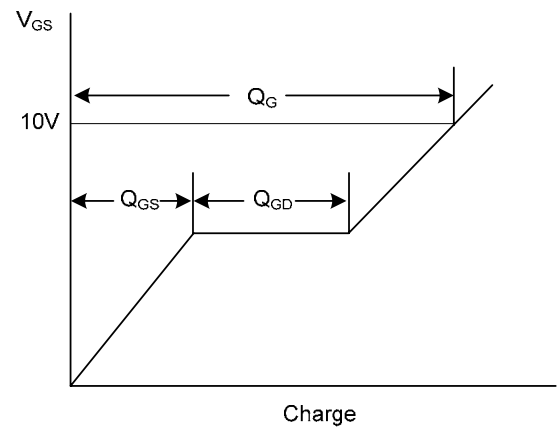


Fig. 3B Gate Charge Waveform

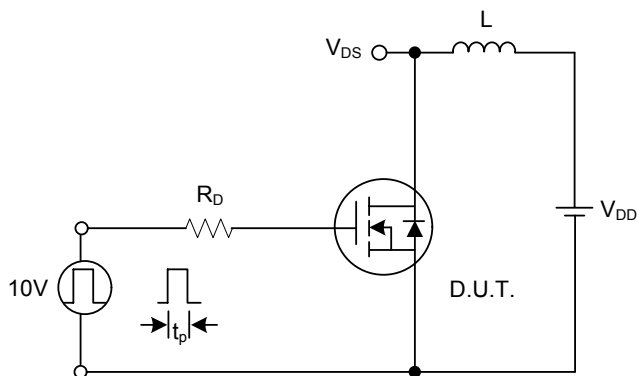


Fig. 4A Unclamped Inductive Switching Test Circuit

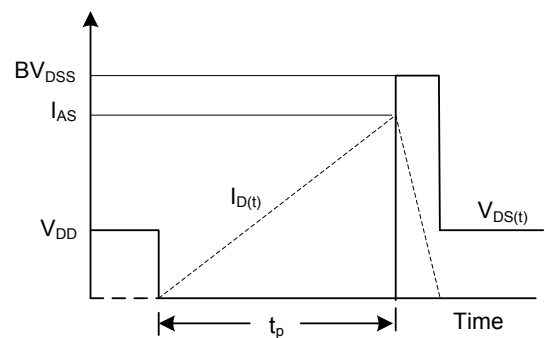
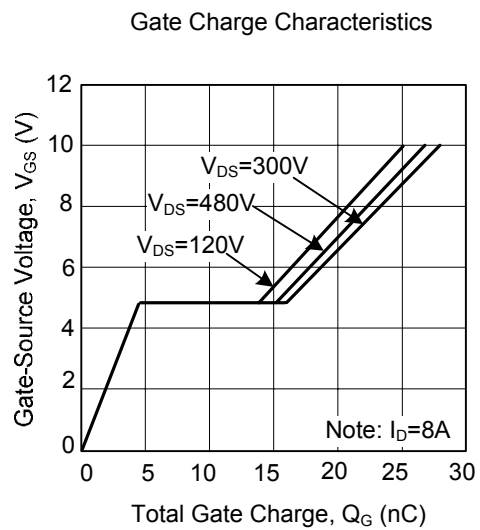
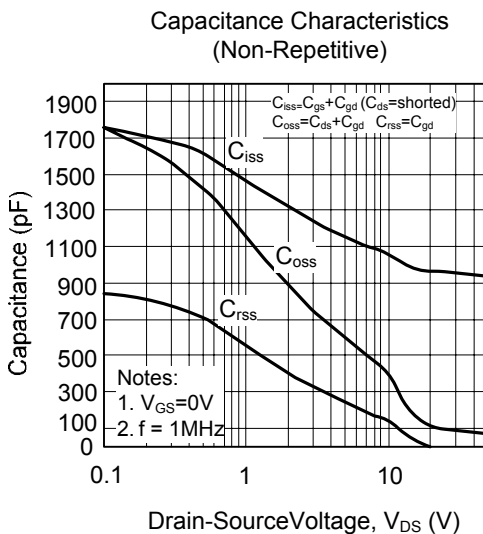
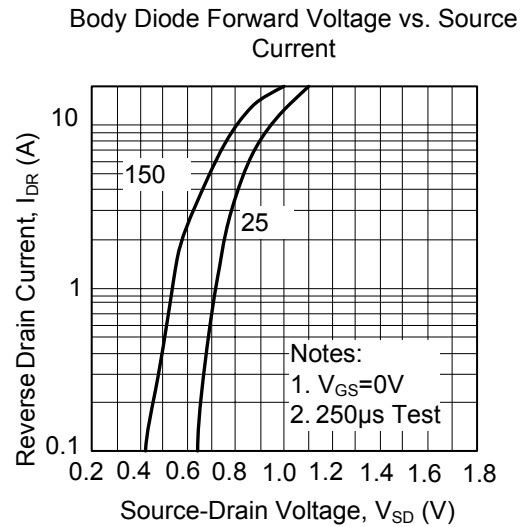
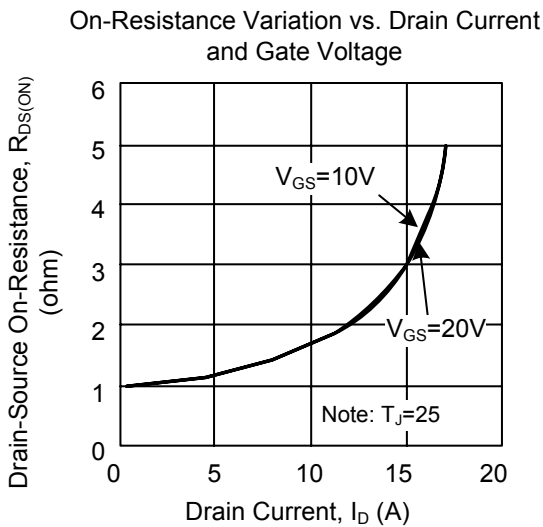
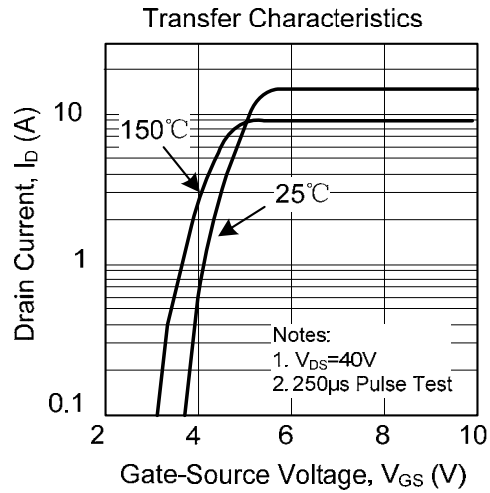
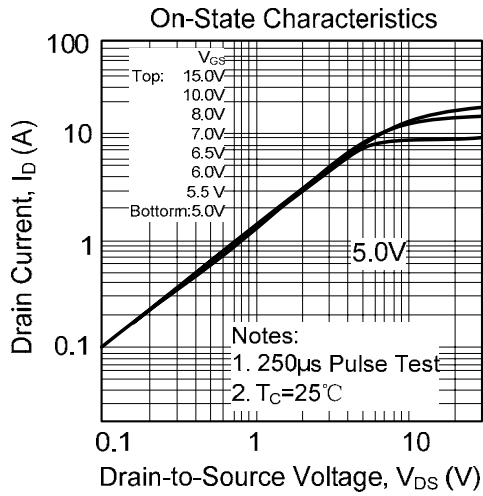


Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)

