



7N60Z

Power MOSFET

7.4 Amps, 600/650 Volts N-CHANNEL MOSFET

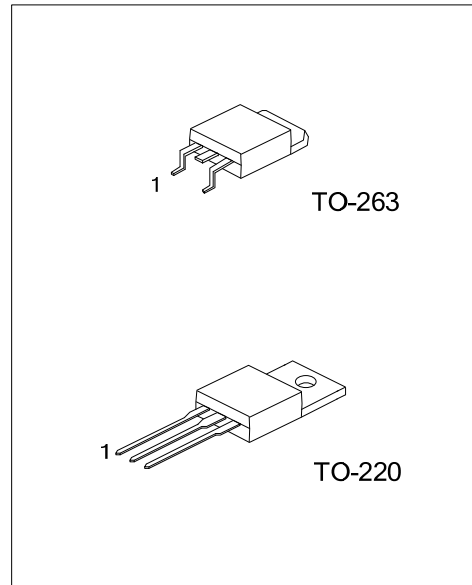
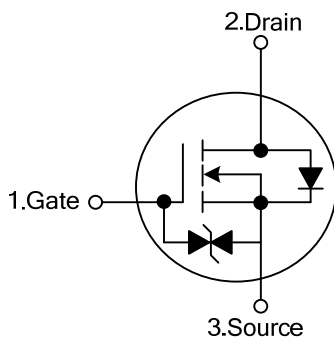
DESCRIPTION

The UTC **7N60Z** is a high voltage 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 in high speed switching applications of switching power supplies and adaptors.

FEATURES

- * $R_{DS(ON)} = 1\Omega @ V_{GS} = 10V$
- * Ultra Low Gate Charge (Typical 29 nC)
- * Low Reverse Transfer Capacitance ($C_{RSS} =$ typical 16pF)
- * Fast Switching Capability
- * Avalanche Energy Tested
- * Improved dv/dt Capability, High Ruggedness

SYMBOL



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7N60ZL-x-TA3-T	7N60ZG-x-TA3-T	TO-220	G	D	S	Tube
7N60ZL-x-TQ2-T	7N60ZG-x-TQ2-T	TO-263	G	D	S	Tube
7N60ZL-x-TQ2-R	7N60ZG-x-TQ2-R	TO-263	G	D	S	Tape Reel

Note: Pin Assignment: G: Gate D: Drain S: Source

<p>7N60ZL-x-TA3-T</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TQ2: TO-263</p> <p>(3) A: 600V, B: 650V</p> <p>(4) G: Halogen Free, L: Lead Free</p>
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■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage	7N60Z-A	V _{DSS}	600	V
	7N60Z-B		650	V
Gate-Source Voltage		V _{GSS}	±30	V
Avalanche Current (Note 2)		I _{AR}	7.4	A
Continuous Drain Current		I _D	7.4	A
Pulsed Drain Current (Note 1)		I _{DM}	29.6	A
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	600	mJ
	Repetitive (Note 2)	E _{AR}	14.2	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220/ TO-263	P _D	142	W
	TO-220F/TO-220F1		48	W
Junction Temperature		T _J	+150	°C
Storage Temperature		T _{STG}	-55 ~ +150	°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 maximum junction temperature

3. L = 19.5mH, I_{AS} = 7.4A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C

4. I_{SD} ≤ 7.4A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/ TO-263	θ _{JA}	62.5	°C/W
Junction to Case	TO-220/ TO-263	θ _{JC}	0.88	°C/W

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

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	7N60Z-A	BV _{DSS}	V _{GS} = 0V, I _D = 250μA	600			V
	7N60Z-B			650			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} = 600V, V _{GS} = 0V			1	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} = 30V, V _{DS} = 0V			10	μA
	Reverse		V _{GS} = -30V, V _{DS} = 0V			-10	μA
Breakdown Voltage Temperature Coefficient		ΔBV _{DSS} /ΔT _J	I _D = 250μA, Referenced to 25°C		0.67		V/°C
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} = V _{GS} , I _D = 250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} = 10V, I _D = 3.7A			1	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0 MHz			1400	pF
Output Capacitance		C _{OSS}				180	pF
Reverse Transfer Capacitance		C _{RSS}			16	21	pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		t _{D(ON)}	V _{DD} = 300V, I _D = 7.4A, R _G = 25Ω (Note 1, 2)			70	ns
Turn-On Rise Time		t _R				170	ns
Turn-Off Delay Time		t _{D(OFF)}				140	ns
Turn-Off Fall Time		t _F				130	ns
Total Gate Charge		Q _G	V _{DS} =480V, I _D =7.4A, V _{GS} =10 V (Note 1, 2)		29	38	nC
Gate-Source Charge		Q _{GS}			7		nC
Gate-Drain Charge		Q _{GD}			14.5		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}	$V_{GS} = 0V, I_S = 7.4 A$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I_S				7.4	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				29.6	A
Reverse Recovery Time	t_{RR}	$V_{GS} = 0V, I_S = 7.4 A,$		320		ns
Reverse Recovery Charge	Q_{RR}	$di_F / dt = 100A/\mu s$ (Note 1)		2.4		μC

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

■ TEST CIRCUITS AND WAVEFORMS

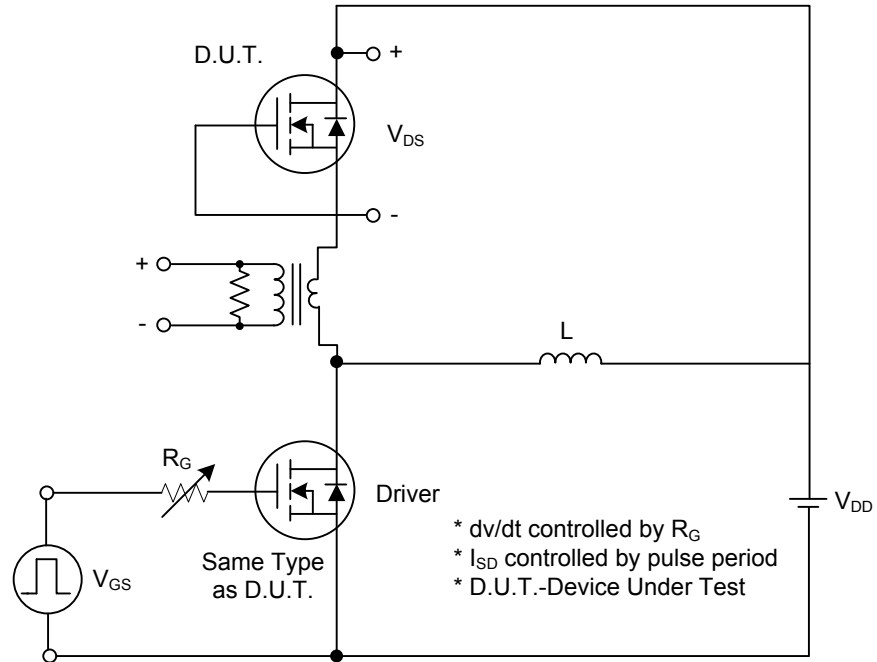


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

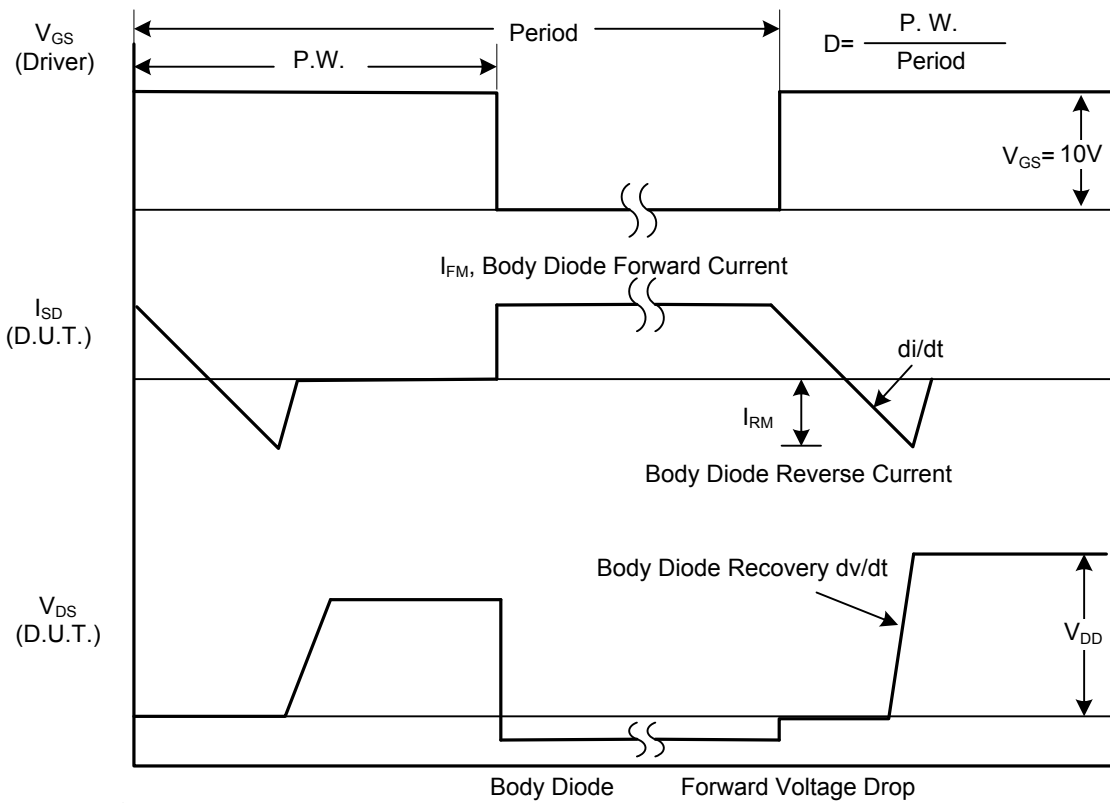


Fig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

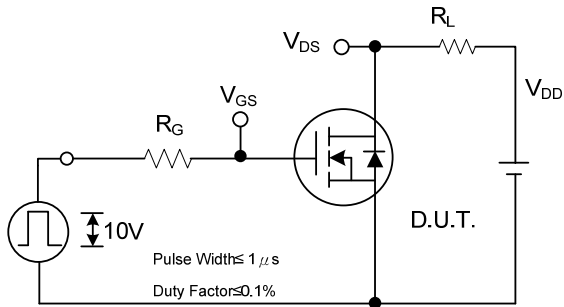


Fig. 2A Switching Test Circuit

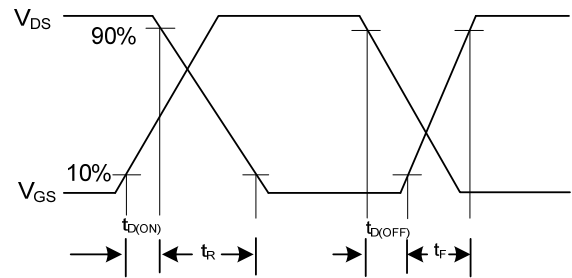


Fig. 2B Switching Waveforms

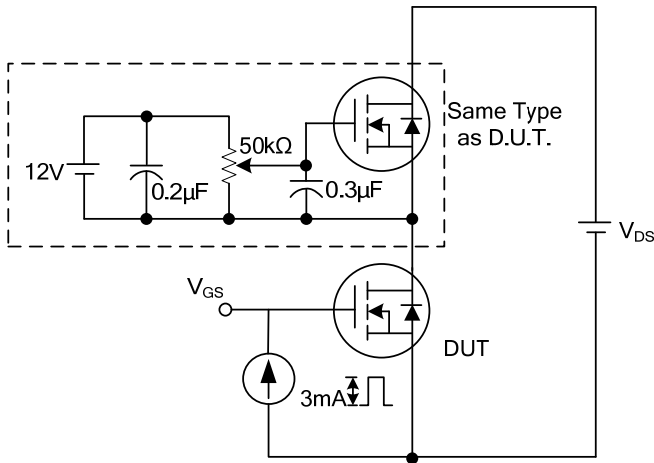


Fig. 3A Gate Charge Test Circuit

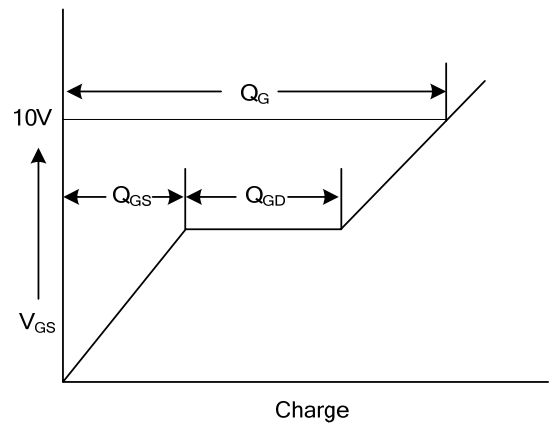


Fig. 3B Gate Charge Waveform

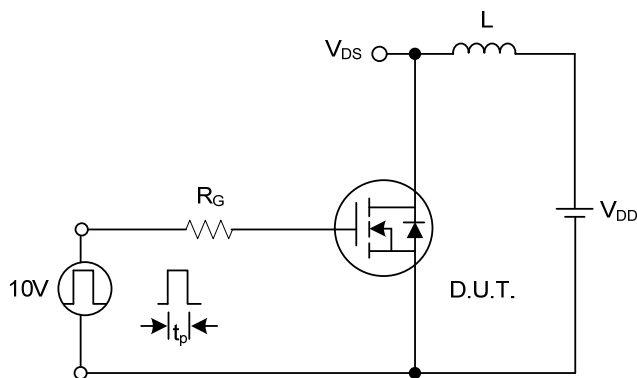


Fig. 4A Unclamped Inductive Switching Test Circuit

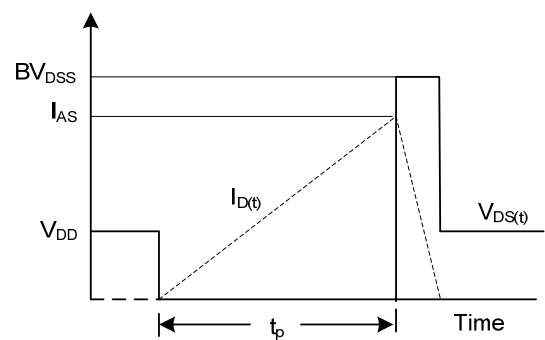
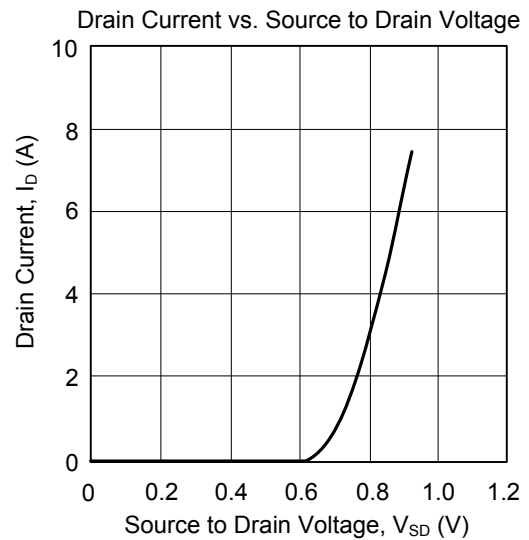
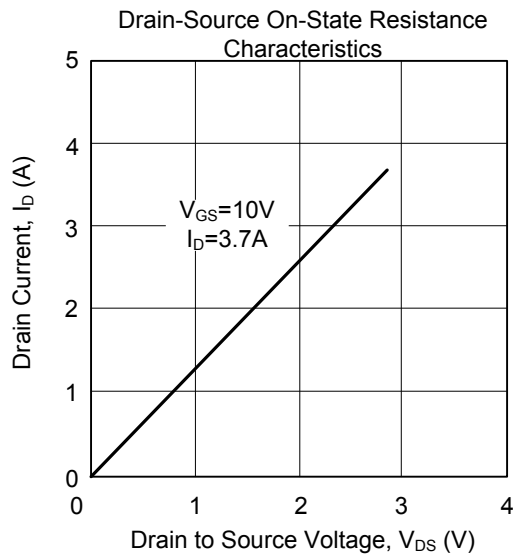
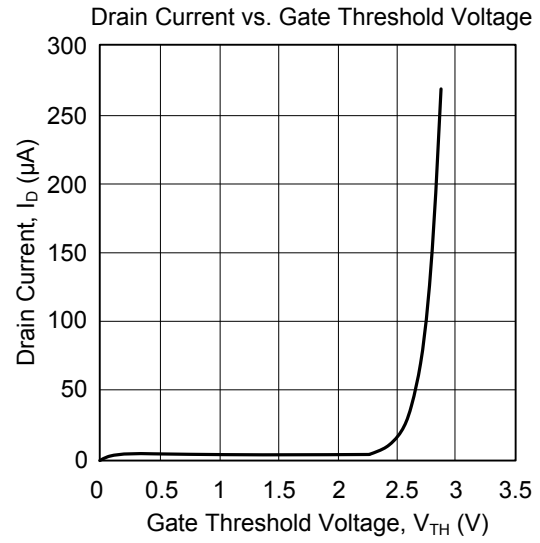
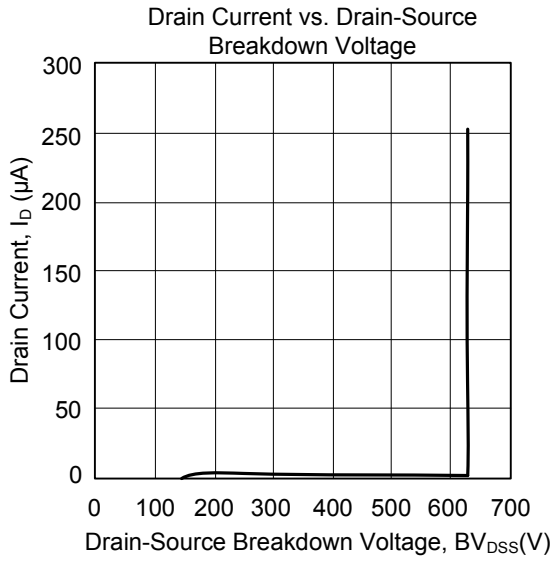


Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



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