



22N60

Power MOSFET

HEXFET POWER MOSFET

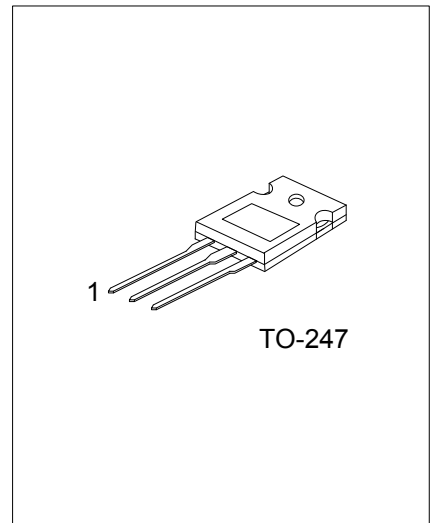
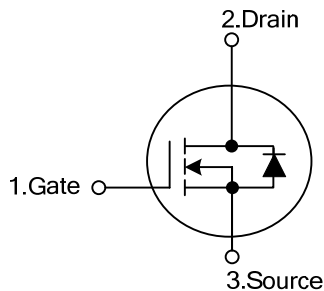
■ DESCRIPTION

As the SMPS MOSFET, the UTC **22N60** uses UTC's advanced technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

■ FEATURES

- * $R_{DS(ON)} = 240\text{ m}\Omega$
- * Ultra Low Gate Charge (Typical 150 nC)
- * Low Reverse Transfer Capacitance ($C_{RSS} = \text{Typical } 36\text{ pF}$)
- * Fast Switching Capability
- * Avalanche Energy Specified
- * Improved dv/dt Capability, High Ruggedness

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
22N60L-T47-T	22N60G-T47-T	TO-247	G	D	S	Tube

<p>22N60L-T47-T</p> <ul style="list-style-type: none"> (1)Packing Type (2)Package Type (3)Lead Free 	<ul style="list-style-type: none"> (1) T: Tube (2) T47: TO-247 (3) G: Halogen Free, L: Lead Free
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■ 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}	± 30	V
Avalanche Current		I_{AR}	22	A
Continuous Drain Current		I_D	22	A
Pulsed Drain Current (Note 1)		I_{DM}	88	A
Avalanche Energy	Single Pulsed	E_{AS}	380	mJ
	Repetitive	E_{AR}	37	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	18	V/ns
Power Dissipation		P_D	370	W
Junction Temperature		T_J	150	$^\circ\text{C}$
Operating Temperature		T_{OPR}	-55 ~ +150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

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	RATINGS	UNIT
Junction to Ambient	θ_{JA}	40	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	0.34	$^\circ\text{C}/\text{W}$

■ 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}	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	600			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=600\text{V}, V_{GS}=0\text{V}$			50	μA
Gate- Source Leakage Current	I_{GSS}	$V_{DS}=0\text{V}, V_{GS}=\pm 30\text{V}$			± 100	nA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=1\text{mA}$, Referenced to 25°C		0.30		$\text{V}/^\circ\text{C}$
ON CHARACTERISTICS						
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-Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}, I_D=13\text{A}$ (Note 4)		240	280	m Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{DS}=25\text{V}, V_{GS}=0\text{V}, f=1.0\text{MHz}$		3570		pF
Output Capacitance	C_{OSS}			350		pF
Reverse Transfer Capacitance	C_{RSS}			36		pF
SWITCHING PARAMETERS						
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=300\text{V}, I_D=22\text{A}, R_G=6.2\Omega$ $V_{GS}=10\text{V}$ (Note 4)		26		ns
Turn-ON Rise Time	t_R			99		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			48		ns
Turn-OFF Fall-Time	t_F			37		ns
Total Gate Charge	Q_G	$V_{DS}=480\text{V}, V_{GS}=10\text{V}, I_D=22\text{A}$ (Note 4)			150	nC
Gate Source Charge	Q_{GS}				45	nC
Gate Drain Charge	Q_{GD}				76	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}	$V_{GS}=0V, I_S=22A$			1.5	V
Continuous Source Current (Body Diode) (Note 1)	I_S				22	A
Pulsed Source Current (Body Diode)	I_{SM}				88	A
Reverse Recovery Time	t_{RR}	$I_S=22A,$		590	890	ns
Reverse Recovery Charge	Q_{RR}	$di/dt=100A/\mu s$ (Note 4)		7.2	11	μC

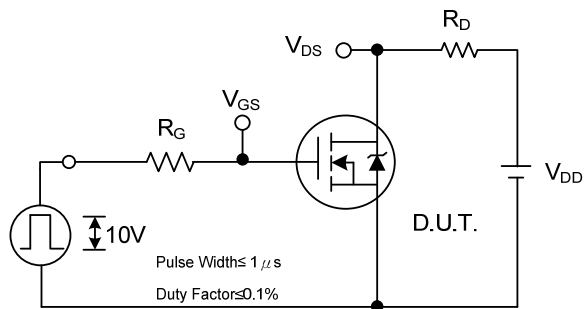
Note: 1. Repetitive rating; pulse width limited by max. junction temperature.

2. $T_J = 25^\circ C, L = 1.5mH, R_G=25\Omega, I_{AS} = 22A$

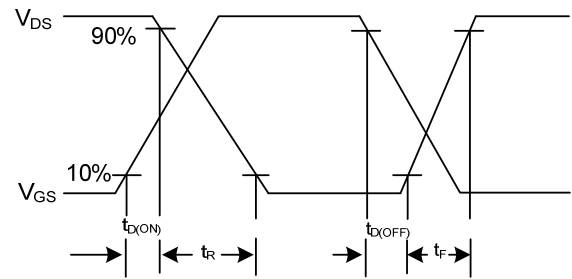
3. $I_{SD} \leq 22A, di/dt \leq 540 A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ C.$

4. Pulse Width $\leq 300 \mu s, Duty Cycle \leq 2\%.$

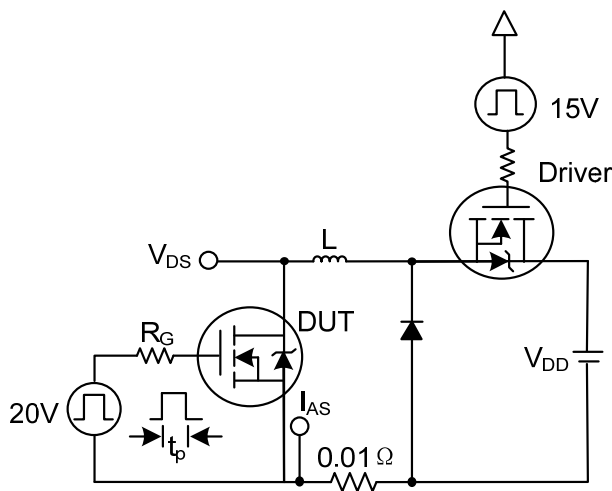
■ TEST CIRCUITS



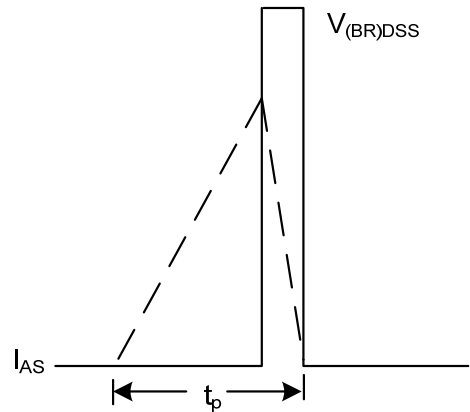
Switching Test Circuit



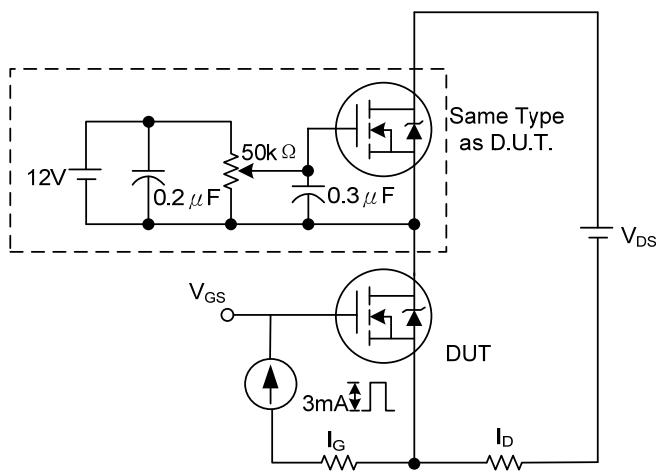
Switching Waveforms



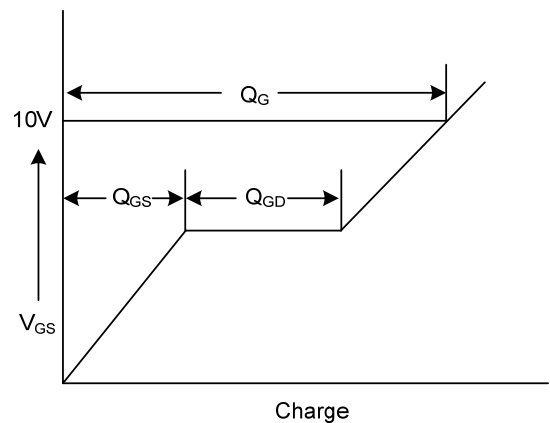
Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



Gate Charge Test Circuit



Gate Charge Waveform

■ TEST CIRCUITS(Cont.)

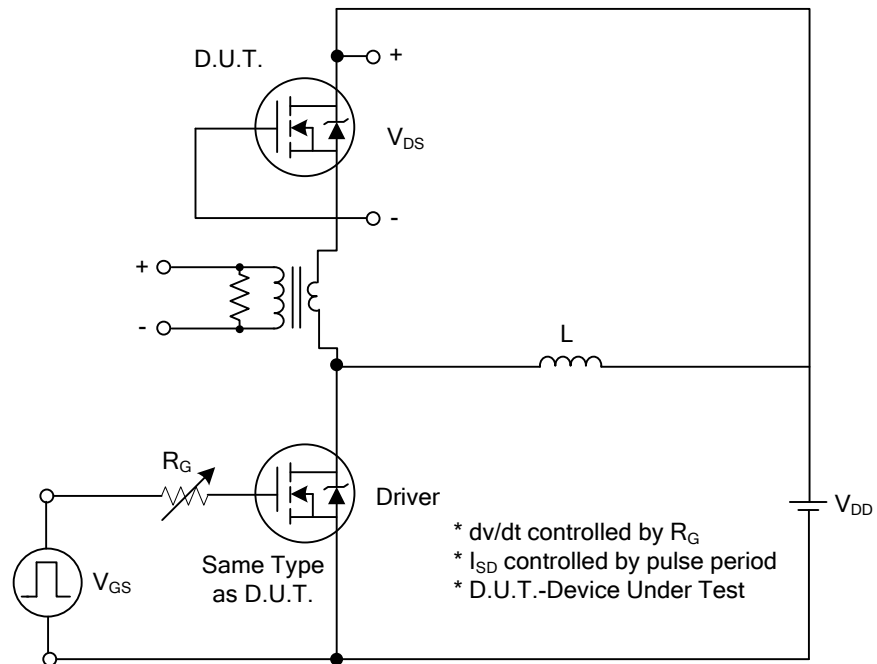
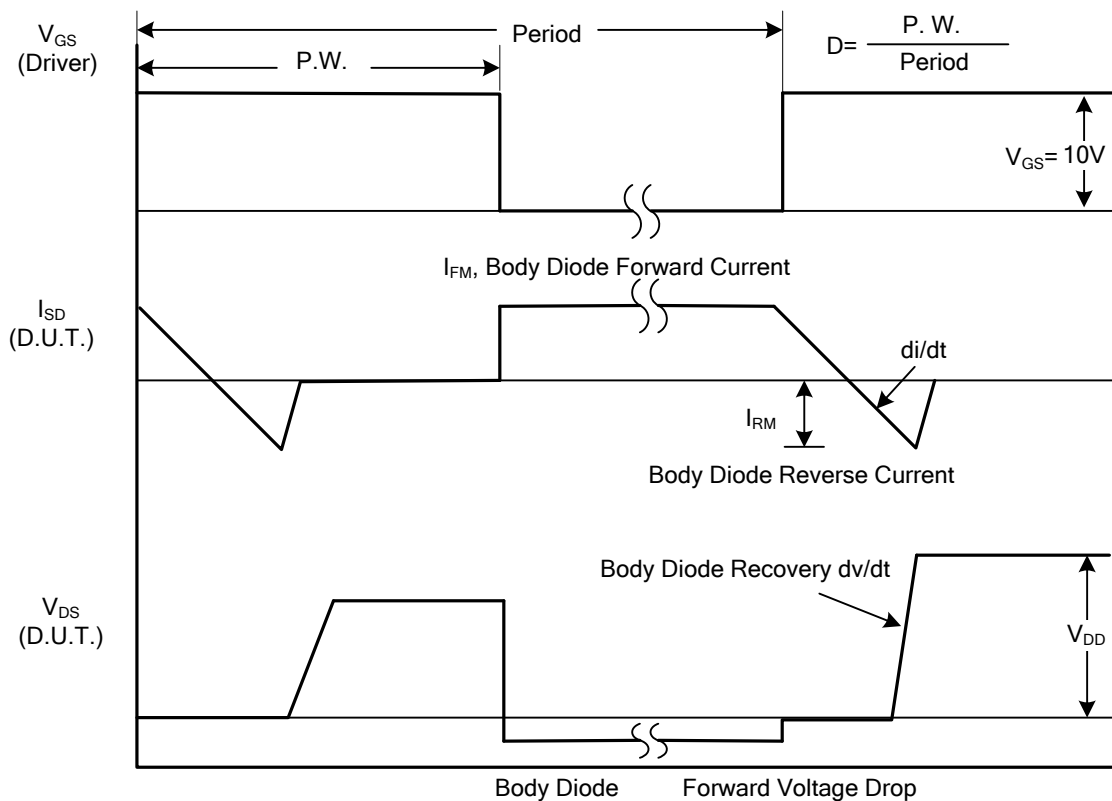
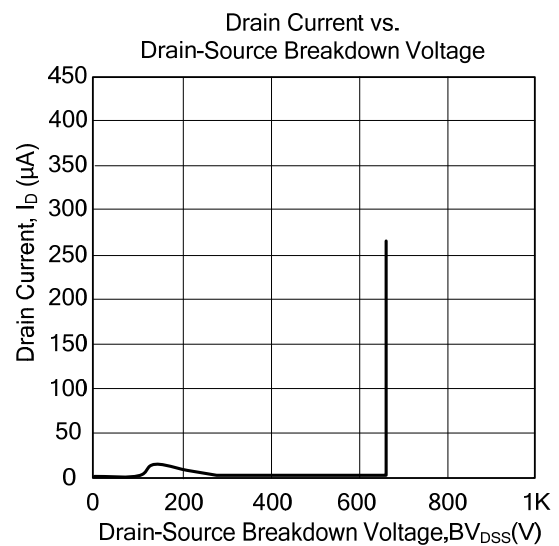
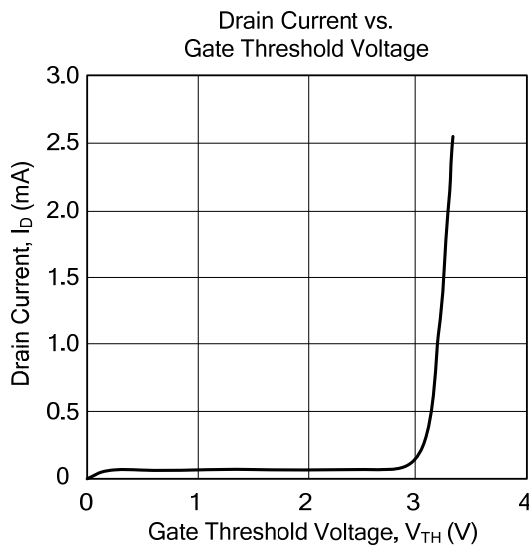
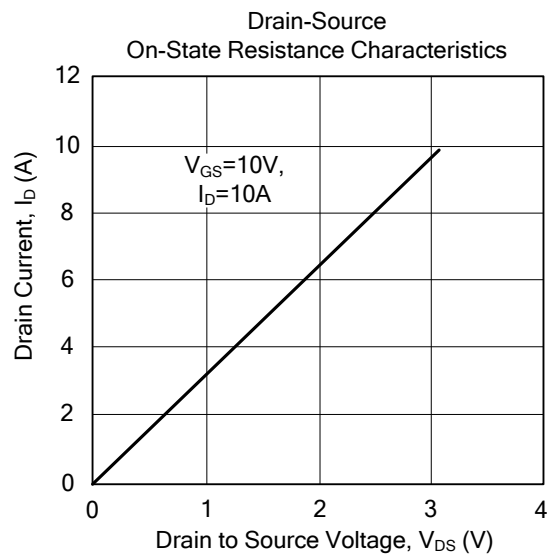
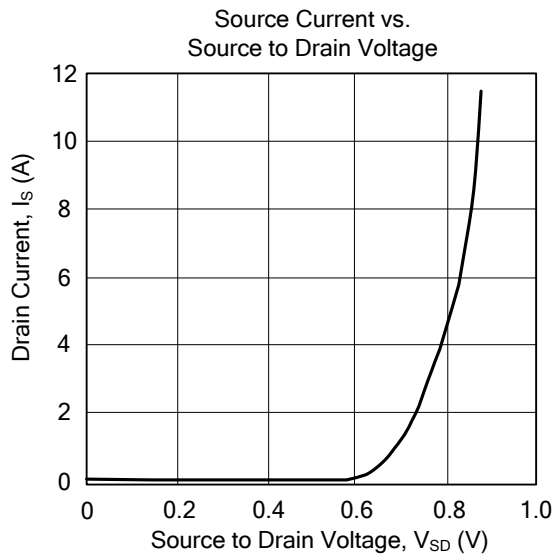


Fig. 1A Peak Diode Recovery dv/dt Test Circuit



TYPICAL CHARACTERISTICS



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