



23N50E

Preliminary

Power MOSFET

**23A, 500V N-CHANNEL
POWER MOSFET**

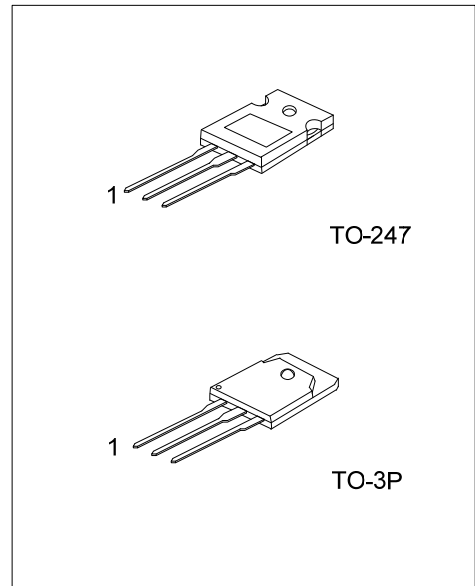
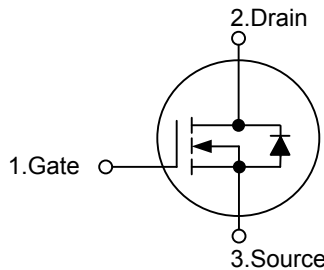
■ DESCRIPTION

The **23N50E** uses advanced UTC 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, in PWM applications, motor controls, inverters, choppers, audio amplifiers and high energy pulse circuits.

■ FEATURES

- * $R_{DS(ON)} \leq 245 \text{ m}\Omega @ V_{GS}=10\text{V}, I_D=11.5\text{A}$
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability

■ SYMBOL



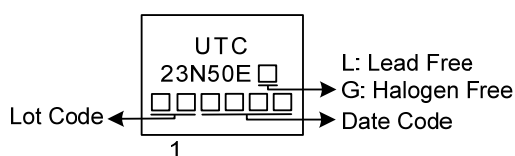
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
23N50EL-T47-T	23N50EG-T47-T	TO-247	G	D	S	Tube
23N50EL-T3P-T	23N50EG-T3P-T	TO-3P	G	D	S	Tube

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

<p>23N50EG-T47-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube (2) T47: TO-247, T3P: TO-3P (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Gate-Source Voltage		V_{GS}	± 30	V
Continuous Drain Current	Continuous ($V_{GS}=0V$)	I_D	± 23	A
Pulsed Drain Current	Pulsed (Note 2)	I_{DM}	± 92	A
Avalanche Current (Note2)		I_{AR}	23	A
Avalanche Energy	Repetitive(Note2)	E_{AR}	31.5	mJ
	Single Pulsed(Note3)	E_{AS}	767.3	
Power Dissipation	$T_A=25^\circ C$	TO-247	2.50	W
		TO-3P	3.00	
	$T_C=25^\circ C$	TO-247	315	W
		TO-3P	416	
Peak Diode Recovery dv/dt (Note4)		dv/dt	5.4	V/ns
Junction Temperature		T_J	+150	$^\circ C$
Strong Temperature		T_{STG}	-55 ~ +150	$^\circ C$

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. Pulse width limited by $T_{J(MAX)}$

3. $I_{AS}=21A$, $L=3.4mH$, $V_{DD}=50V$, $R_G=50\Omega$, Starting $T_J=25^\circ C$

4. $I_{SD}\leq I_D$, $di/dt\leq 100A/\mu s$, $V_{DD}\leq 500V$, $T_J\leq 150^\circ C$, Suggested=2.35 Ω .

■ THERMAL DATA

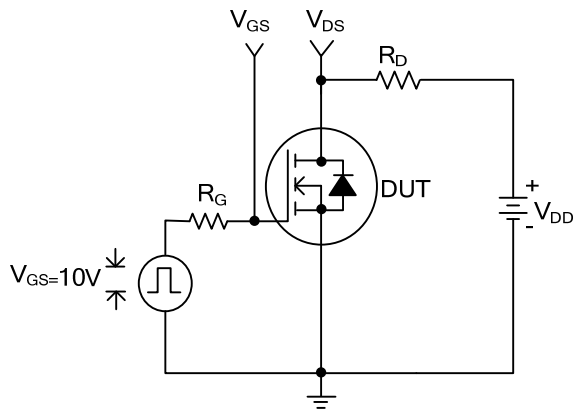
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-247	θ_{JA}	50	$^\circ C/W$
	TO-3P		30	
Junction to Case	TO-247	θ_{JC}	0.4	$^\circ C/W$
	TO-3P		0.3	

■ 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}	$V_{GS}=0V, I_D=250\mu A$	500			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=500V, V_{GS}=0V$			25	μA
Gate-Source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 30V$			100	nA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ\text{C}, I_D=1.0mA$		0.78		$V/^\circ\text{C}$
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2		4	V
Static Drain-Source On Resistance (Note)	$R_{DS(ON)}$	$V_{GS}=10V, I_D=11.5A$		209	245	m Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1.0MHz$		2700	4050	pF
Output Capacitance	C_{OSS}			330	495	
Reverse Transfer Capacitance	C_{RSS}			20	30	
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{DS}=50V, V_{GS}=10V, I_D=1.3A$			90	nC
Gate Source Charge	Q_{GS}				40	
Gate Drain Charge	Q_{GD}				40	
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=30V, I_D=0.5A, V_{DS}=10V, R_G=25\Omega$			160	ns
Turn-ON Rise Time	t_R				210	
Turn-OFF Delay Time	$t_{D(OFF)}$				530	
Turn-OFF Fall-Time	t_F				180	
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				21	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				84	
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=23A, V_{GS}=0V, T_J=25^\circ\text{C}$		0.9	1.35	V
Reverse Recovery Time	t_{rr}	$I_F=23A, dI/dt=100A/\mu s, T_J=25^\circ\text{C}, V_{DS}=0V$		0.5		ns
Reverse Recovery Charge	Q_{rr}			8.0		μC

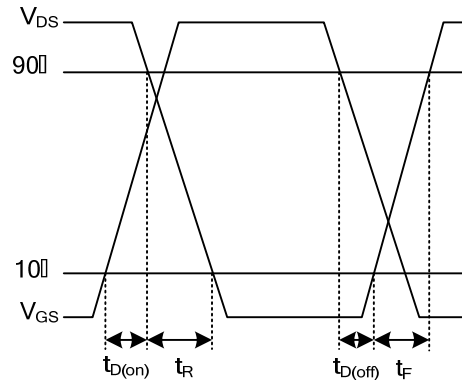
Note: Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

TEST CIRCUITS AND WAVEFORMS

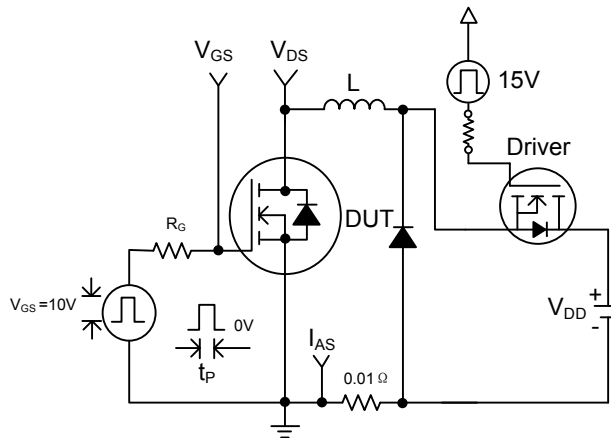


Pulse Width $\leq 1\mu s$ Duty Cycle $\leq 0.1\%$

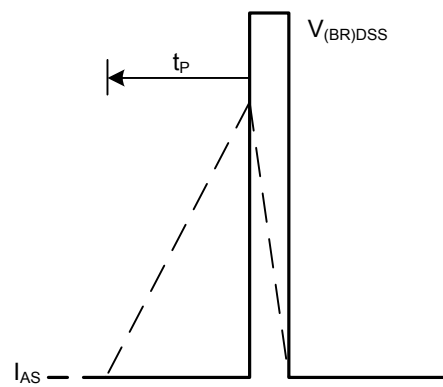
Switching Time Test Circuit



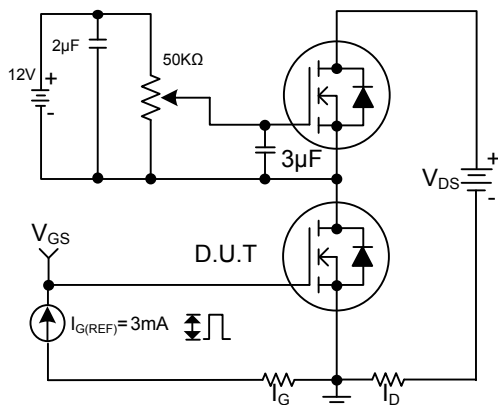
Switching Time Waveforms



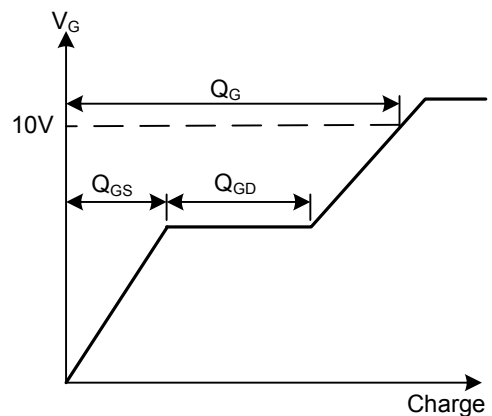
Unclamped Inductive Test Circuit



Unclamped Inductive Waveforms



Gate Charge Test Circuit



Basic Gate Charge Waveform

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