



## 1N50-KW

Preliminary

Power MOSFET

### 1A, 500V N-CHANNEL POWER MOSFET

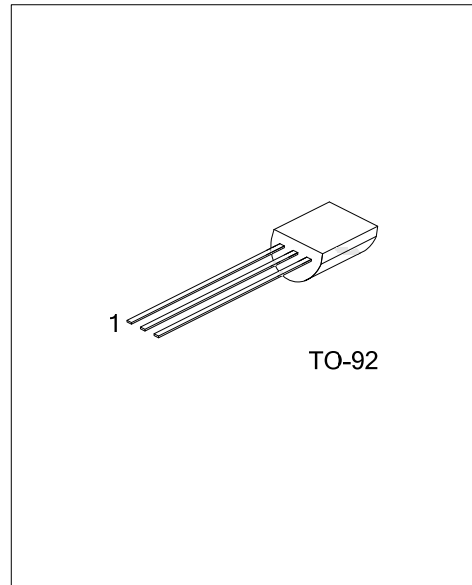
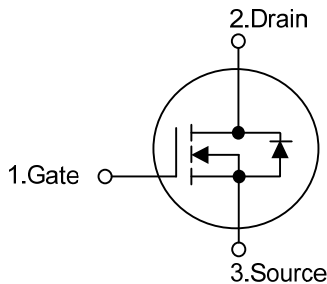
#### DESCRIPTION

The UTC 1N50-KW is a high voltage MOSFET and is 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

- \*  $R_{DS(ON)} < 10\Omega$  @  $V_{GS}=10V, I_D=0.5A$
- \* Fast switching capability
- \* Avalanche energy specified
- \* Improved dv/dt capability, high ruggedness

#### SYMBOL



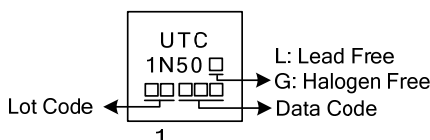
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
1N50L-T92-B	1N50G-T92-B	TO-92	G	D	S	Tape Box
1N50L-T92-K	1N50G-T92-K	TO-92	G	D	S	Bulk

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

<p>1N50L-T92-B</p> <ul style="list-style-type: none"> <li>(1) Packing Type</li> <li>(2) Package Type</li> <li>(3) Green Package</li> </ul>	<ul style="list-style-type: none"> <li>(1) B: Tape Box, K: Bulk</li> <li>(2) T92: TO-92</li> <li>(3) L: Lead Free, G: Halogen Free and Lead Free</li> </ul>
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#### MARKING



### ■ ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V <sub>DSS</sub>	500	V
Gate-Source Voltage	V <sub>GSS</sub>	±30	V
Continuous Drain Current	I <sub>D</sub>	1	A
Avalanche Energy	E <sub>AS</sub>	50	mJ
Single Pulsed (Note 2)			
Peak Diode Recovery dv/dt (Note 3)	dv/dt	4.5	V/ns
Power Dissipation (T <sub>A</sub> =25°C)	P <sub>D</sub>	0.6	W
Junction Temperature	T <sub>J</sub>	+150	°C
Operating Temperature	T <sub>OPR</sub>	-55 ~ +150	°C
Storage Temperature	T <sub>STG</sub>	-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. L = 100mH, I<sub>AS</sub> = 1A, V<sub>DD</sub> = 50V, R<sub>G</sub> = 25Ω, Starting T<sub>J</sub> = 25°C

3. I<sub>SD</sub> ≤ 1.2A, di/dt ≤ 200A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub> = 25°C

### ■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ <sub>JA</sub>	180	°C/W
Junction to Case	θ <sub>JC</sub>	88	°C/W

### ■ ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C, unless otherwise specified)

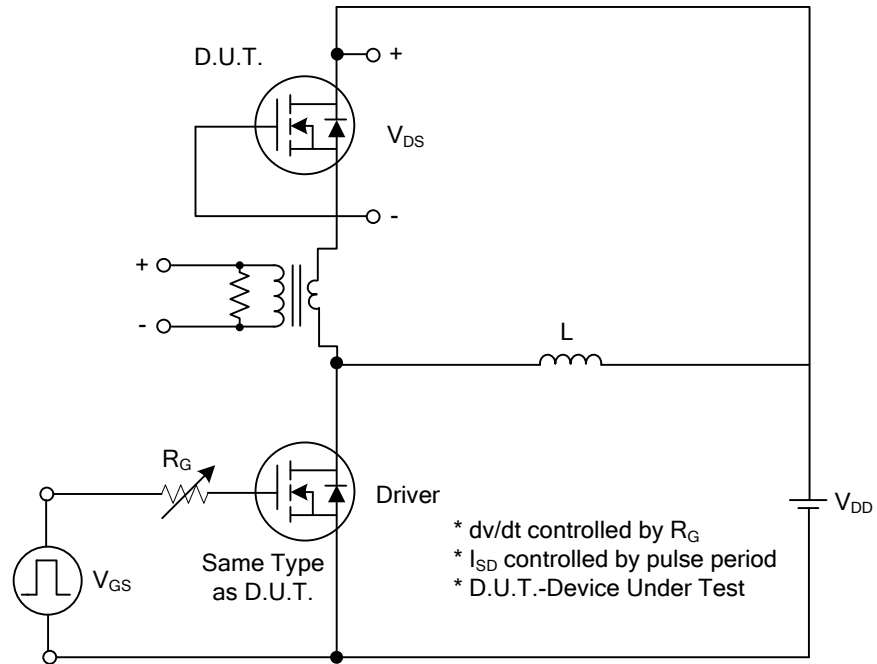
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	500			V	
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =500V, V <sub>GS</sub> =0V			10	μA	
Gate-Source Leakage Current	I <sub>GSS</sub>	Forward			100	nA	
		Reverse			-100	nA	
Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> =250μA		0.4		V/°C	
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	3.0		5.5	V	
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =0.5A		8.6	10	Ω	
<b>DYNAMIC CHARACTERISTICS</b>							
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz		135		pF	
Output Capacitance	C <sub>OSS</sub>				17		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>				4.7		pF
<b>SWITCHING CHARACTERISTICS</b>							
Turn-On Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =30V, I <sub>D</sub> =1A, R <sub>G</sub> =25Ω, V <sub>GS</sub> =10V (Note 2,3)		16.5		ns	
Turn-On Rise Time	t <sub>R</sub>				30		ns
Turn-Off Delay Time	t <sub>D(OFF)</sub>				23		ns
Turn-Off Fall Time	t <sub>F</sub>				30		ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =1.3A R <sub>G</sub> =3.3kΩ(Note 2, 3)		8		nC	
Gate-Source Charge	Q <sub>GS</sub>				2.0		nC
Gate-Drain Charge	Q <sub>GD</sub>				1.4		nC
<b>SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS</b>							
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A			1.4	V	
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>				1.0	A	
Maximum Pulsed Drain-Source Diode Forward Current	I <sub>SM</sub>				4.0	A	

Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

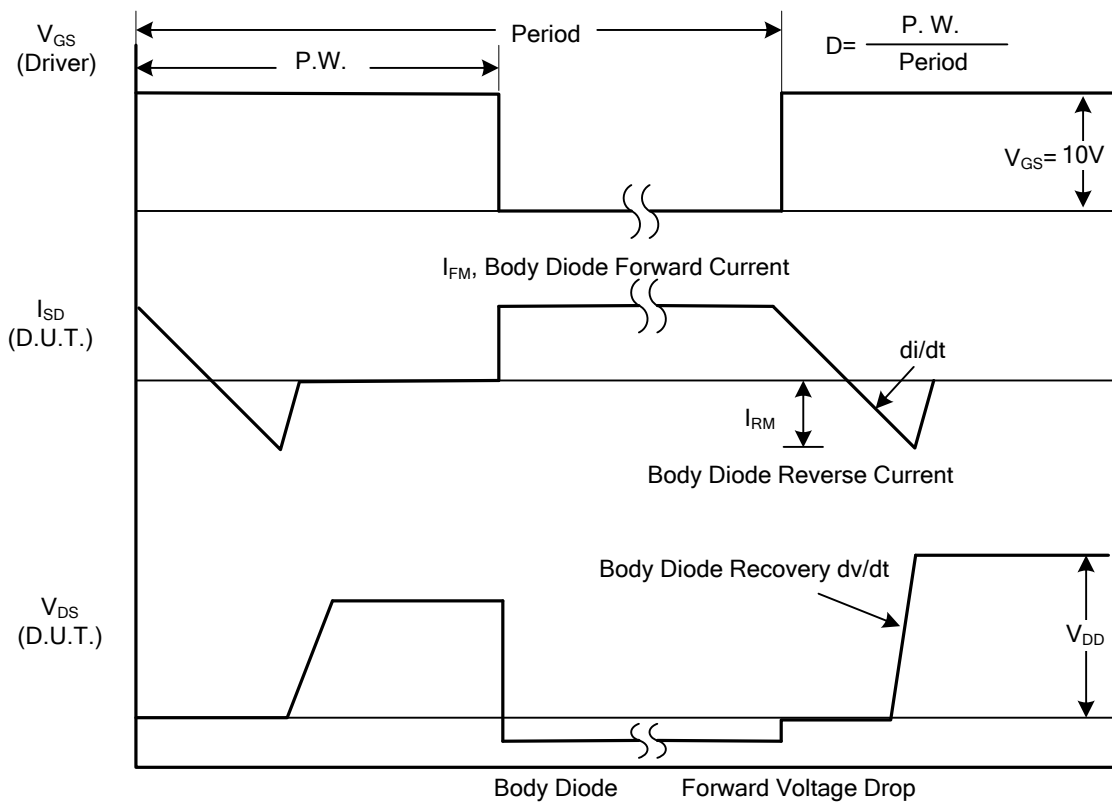
2. Pulse Test: Pulse Width ≤300μs, Duty Cycle≤2%

3. Essentially Independent of Operating Temperature

■ TEST CIRCUITS AND WAVEFORMS

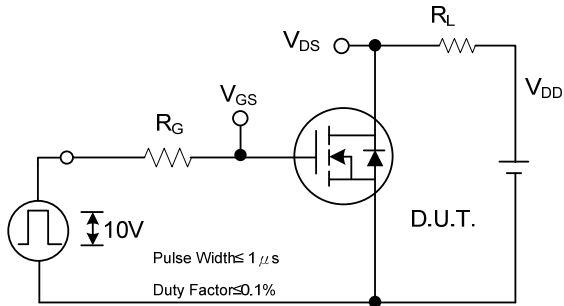


Peak Diode Recovery  $dv/dt$  Test Circuit

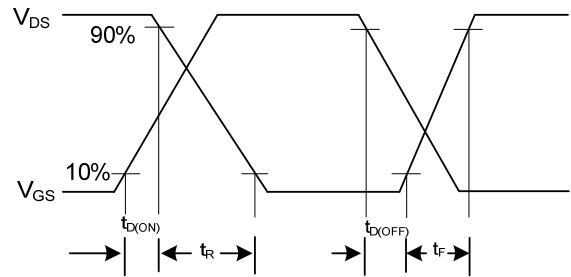


Peak Diode Recovery  $dv/dt$  Waveforms

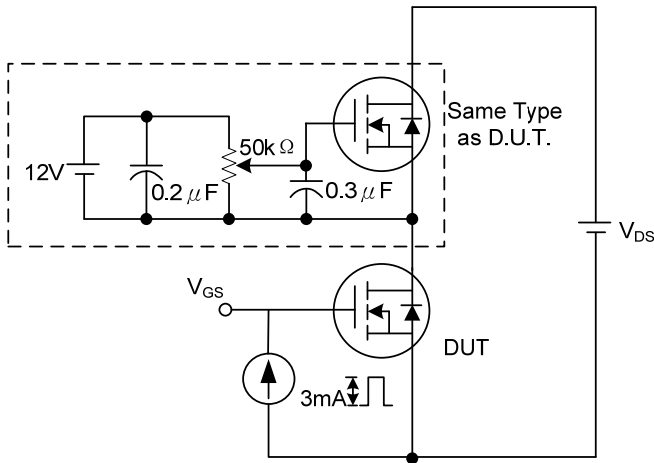
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



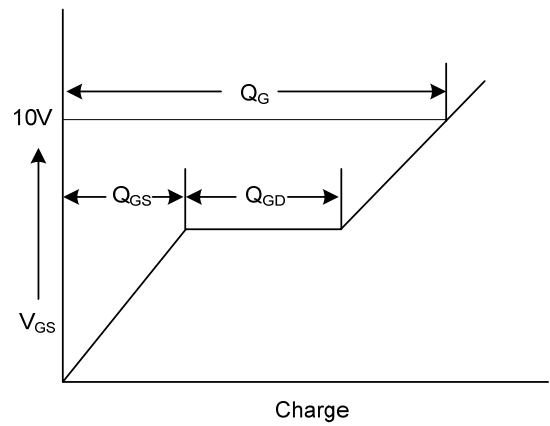
Switching Test Circuit



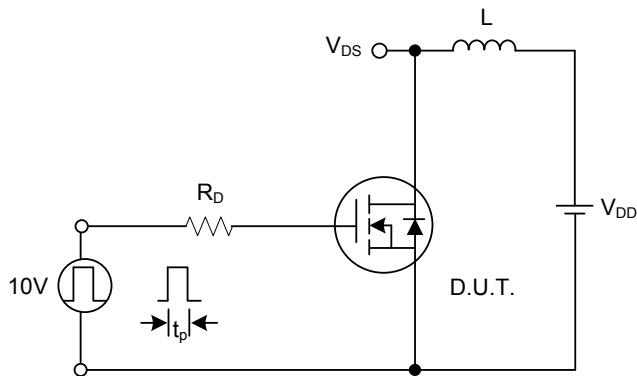
Switching Waveforms



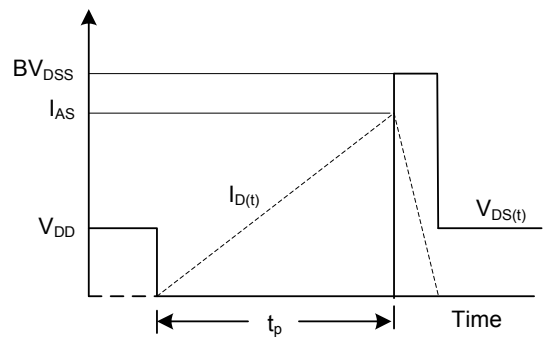
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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