



1N50-TA

Power MOSFET

1.0A, 500V N-CHANNEL POWER MOSFET

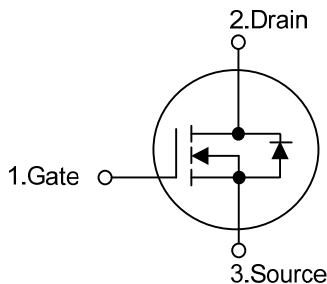
DESCRIPTION

The UTC **1N50-TA** 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

- * $R_{DS(ON)} < 10.5\Omega @ V_{GS}=10V, I_D=0.5A$
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

SYMBOL

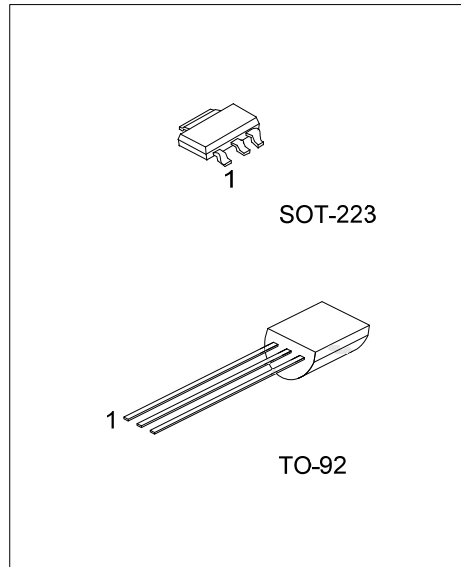


ORDERING INFORMATION

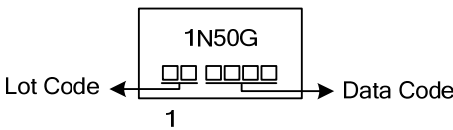
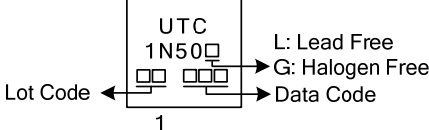
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
-	1N50G-AA3-R	SOT-223	G	D	S	Tape Reel
1N50L-T92-B	1N50G-T92-B	TO-92	G	D	S	Tape Box
1N50L-T92-K	1N50G-T92-K	TO-92	G	D	S	Bulk

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

<p>1N50G-AA3-R</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) R: Tape Reel, B: Tape Box, K: Bulk (2) AA3: SOT-223, T92: TO-92 (3) L: Lead Free, G: Halogen Free and Lead Free</p>
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■ MARKING

SOT-223	TO-92
 <p>Diagram of SOT-223 marking: A rectangular package with '1N50G' printed in the center. Below it are four small squares representing a lot code. An arrow labeled 'Lot Code' points left from the squares, and an arrow labeled 'Data Code' points right. A '1' is printed below the squares.</p>	 <p>Diagram of TO-92 marking: A rectangular package with 'UTC' and '1N50' printed in the center. Below them are four small squares representing a lot code. An arrow labeled 'Lot Code' points left from the squares, and an arrow labeled 'Data Code' points right. A '1' is printed below the squares. To the right of the package, 'L: Lead Free' and 'G: Halogen Free' are listed with arrows pointing to the 'L' and 'G' in the part number.</p>

■ ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	500	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	1.0	A
	Pulsed (Note 2)	I_{DM}	4.0	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	10	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	5.0	V/ns
Power Dissipation	SOT-223	P_D	7.8	W
	TO-92		1.42	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

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. $L = 10\text{mH}$, $I_{AS} = 1.4\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

3. $I_{SD} \leq 1.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223	θ_{JA}	150	$^\circ\text{C}/\text{W}$
	TO-92		180	$^\circ\text{C}/\text{W}$
Junction to Case	SOT-223	θ_{JC}	16	$^\circ\text{C}/\text{W}$
	TO-92		88	$^\circ\text{C}/\text{W}$

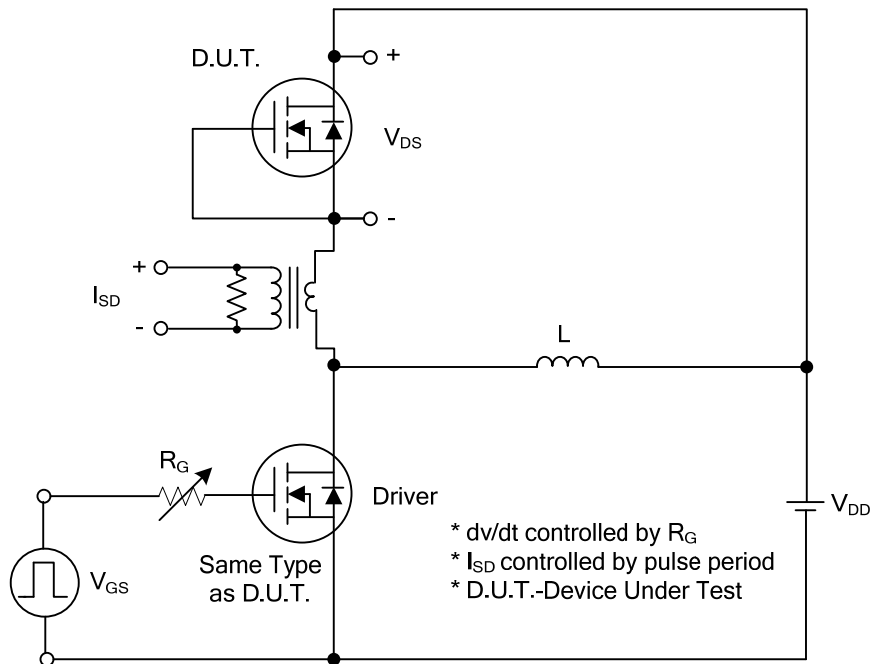
■ ELECTRICAL CHARACTERISTICS (T_J = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	500			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =500V, V _{GS} =0V			1	μA
Gate-Source Leakage Current	Forward	V _{GS} =30V, V _{DS} =0V			100	nA
	Reverse		V _{GS} =-30V, V _{DS} =0V			-100
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	3.0		5.0	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =0.5A			10.5	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1MHz		86		pF
Output Capacitance	C _{OSS}			17		pF
Reverse Transfer Capacitance	C _{RSS}			5.0		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q _G	V _{DS} =30V, V _{GS} =10V, I _D =0.5A, I _G =100μA (Note 1, 2)		8.8		nC
Gate to Source Charge	Q _{GS}			1.2		nC
Gate to Drain Charge	Q _{GD}			1.3		nC
Turn-on Delay Time (Note 1)	t _{D(ON)}	V _{DD} =30V, V _{GS} =10V, I _D =0.5A, R _G =25Ω (Note 1, 2)		32		ns
Rise Time	t _R			10		ns
Turn-off Delay Time	t _{D(OFF)}			33		ns
Fall-Time	t _F			17		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Pulsed Current	I _S				1.0	A
Drain-Source Diode Forward Voltage (Note 1)	I _{SM}				4.0	A
Maximum Body-Diode Continuous Current	V _{SD}	I _S =0.3A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)	t _{rr}	I _S =1.0A, V _{GS} =0V, dI _F /dt=100A/μs		200		ns
Reverse Recovery Charge	Q _{rr}				0.4	

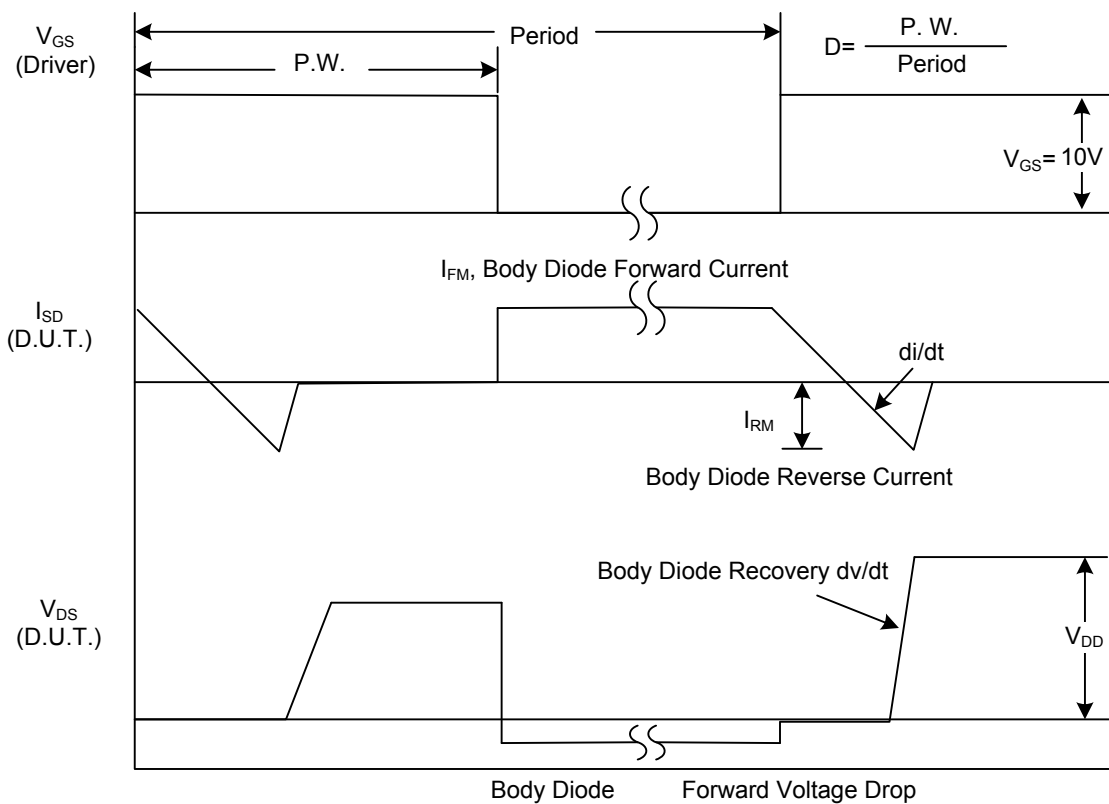
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

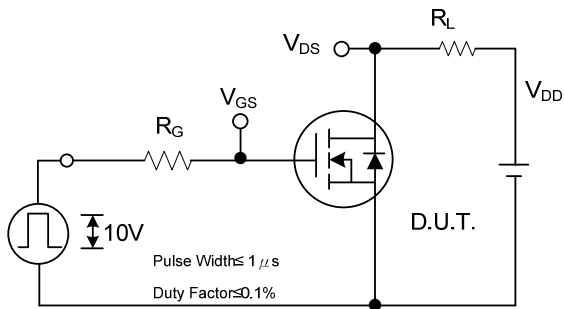


Peak Diode Recovery dv/dt Test Circuit

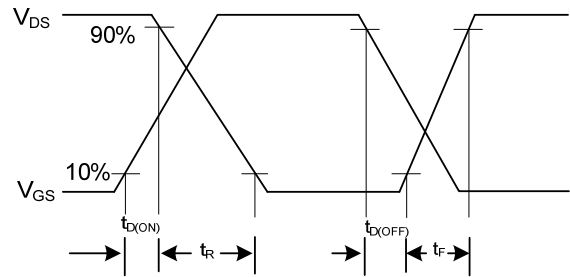


Peak Diode Recovery dv/dt Waveforms

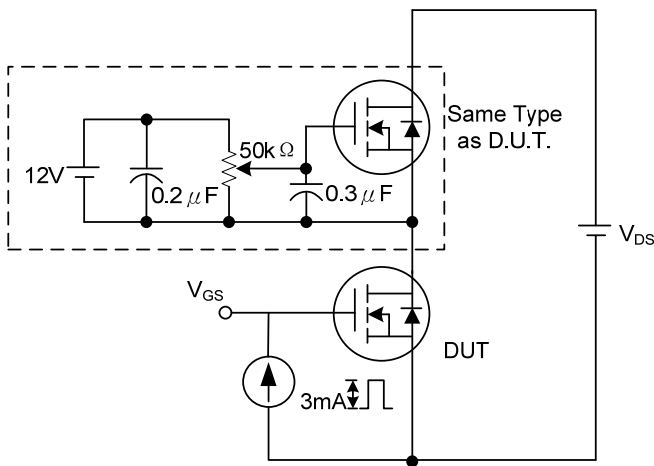
TEST CIRCUITS AND WAVEFORMS (Cont.)



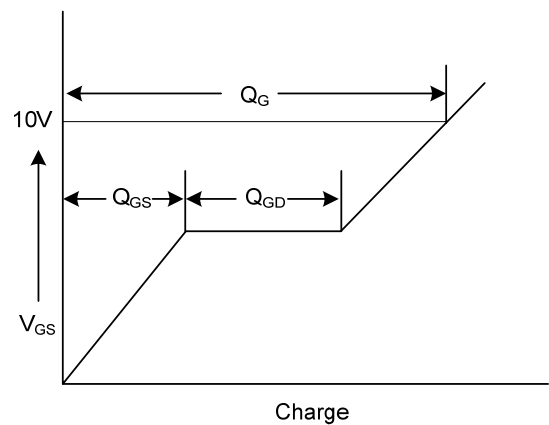
Switching Test Circuit



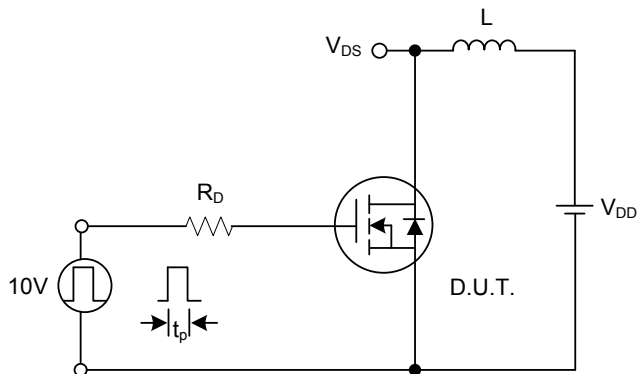
Switching Waveforms



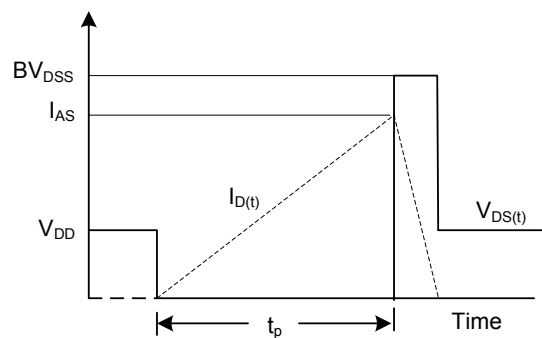
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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