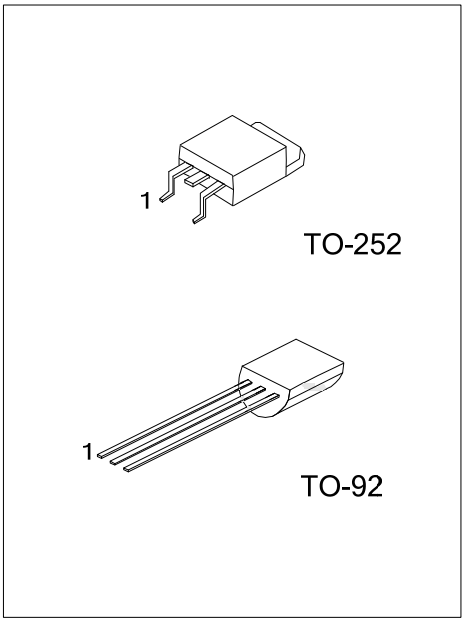
1N50Z

Power MOSFET

1.3A, 500V N-CHANNEL POWER MOSFET



■ DESCRIPTION

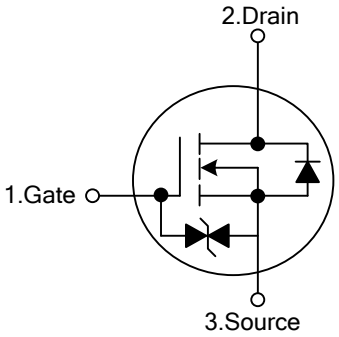
The UTC **1N50Z** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **1N50Z** is generally applied in high efficiency switch mode power supplies, active power factor correction and electronic lamp ballasts based on half bridge topology.

■ FEATURES

* $R_{DS(ON)}$ < 6.0Ω @ V_{GS}=10V
* High Switching Speed
* 100% Avalanche Tested

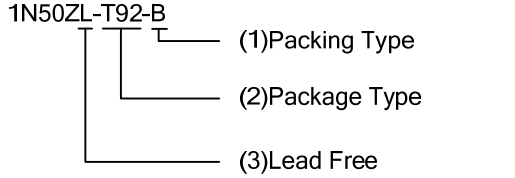
■ SYMBOL



■ ORDERING INFORMATION

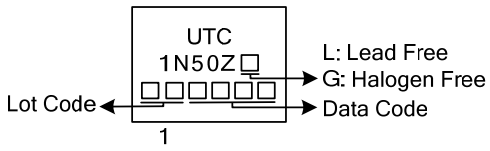
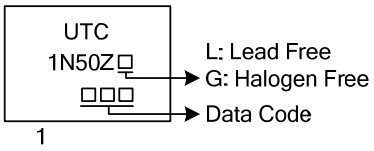
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
1N50ZL-T92-B	1N50ZG-T92-B	TO-92	G	D	S	Tape Box
1N50ZL-T92-K	1N50ZG-T92-K	TO-92	G	D	S	Bulk
1N50ZL-TN3-R	1N50ZG-TN3-R	TO-252	G	D	S	Tape Reel

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



(1) B: Tape Box, K: Bulk, R: Tape Reel
(2) T92: TO-92, TN3: TO-252
(3) L: Lead Free, G: Halogen Free

■ MARKING

TO-252	TO-92
	

■ ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	500	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous (T_C=25°C)	I_D	1.3 (Note 2)	A
	Pulsed (Note 3)	I_{DM}	5 (Note 2)	A
Avalanche Current (Note 3)		I_{AR}	1.3	A
Avalanche Energy	Single Pulsed (Note 4)	E_{AS}	113	mJ
	Repetitive (Note 5)	E_{AR}	2.6	mJ
Power Dissipation	TO-92	P_D	40	W
	TO-252		45	
Derate above 25°C	TO-92		0.32	W/°C
	TO-252		0.36	
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. Drain current limited by maximum junction temperature
3. Repetitive Rating: Pulse width limited by maximum junction temperature
4. I_{SD} ≤ 1.5A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

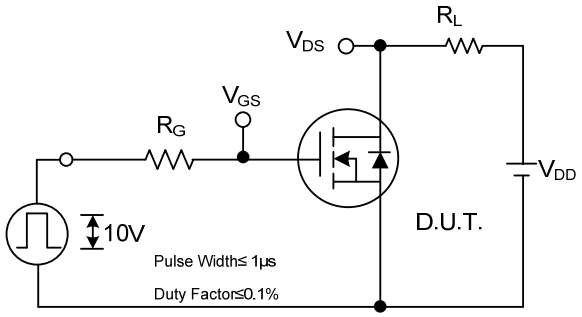
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-92	θ_{JA}	160	°C/W
	TO-252		110	
Junction to Case	TO-92	θ_{JC}	80	°C/W
	TO-252		4.53	

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

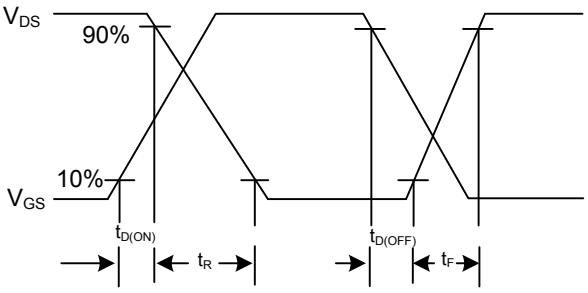
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	500			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=500V, V_{GS}=0V			1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+5	μA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-5	μA
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=0.5A		4.6	6.0	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		220	290	pF
Output Capacitance		C_{OSS}			30	35	pF
Reverse Transfer Capacitance		C_{RSS}			11	13	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{GS}=10V, V_{DS}=50V, I_D=1.3A (Note 1, 2)		12.5	16	nC
Gate to Source Charge		Q_{GS}			3.2		nC
Gate to Drain Charge		Q_{GD}			2.7		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=30V, I_D=0.5A, R_G=25Ω (Note 1, 2)		20	35	ns
Rise Time		t_R			40	50	ns
Turn-OFF Delay Time		$t_{D(OFF)}$			70	90	ns
Fall-Time		t_F			48	60	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				1.3	A
Maximum Body-Diode Pulsed Current		I_{SM}				5	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=1.3A, V_{GS}=0V			1.15	V
Body Diode Reverse Recovery Time		t_{rr}	I_S=1.5A, V_{GS}=0V, dI_F/dt=100A/μs (Note 1)		130		ns
Body Diode Reverse Recovery Charge		Q_{RR}			0.32		μC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%
2. Essentially independent of operating temperature

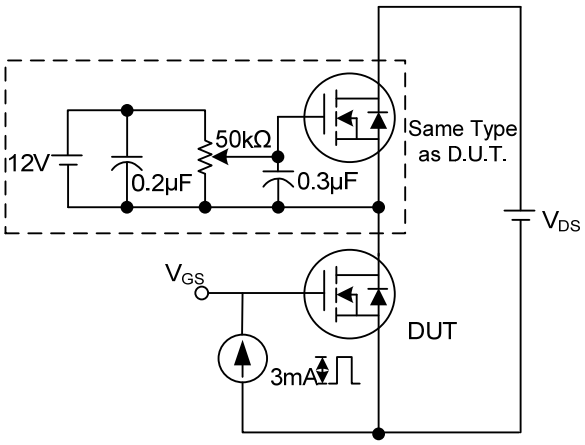
■ TEST CIRCUITS AND WAVEFORMS



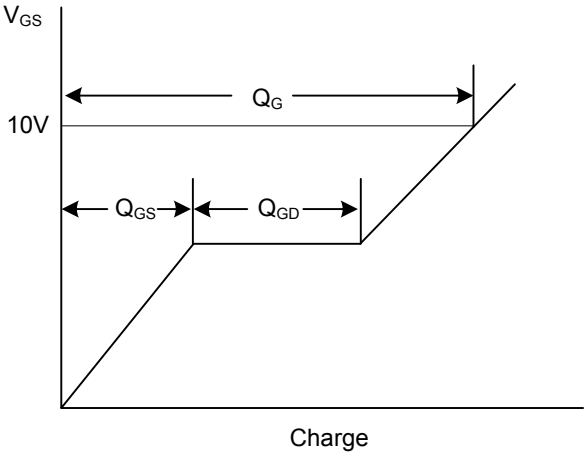
Switching Test Circuit



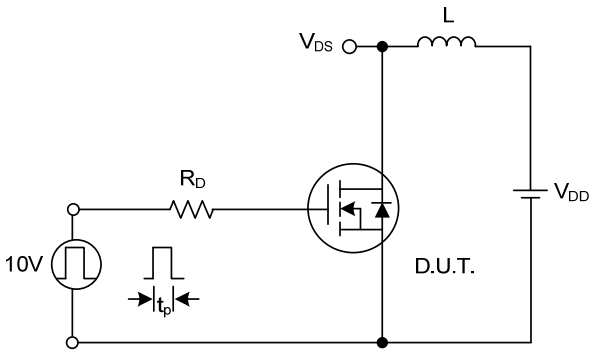
Switching Waveforms



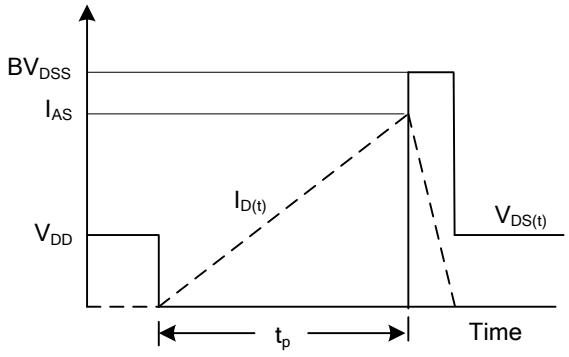
Gate Charge Test Circuit



Gate Charge Waveform

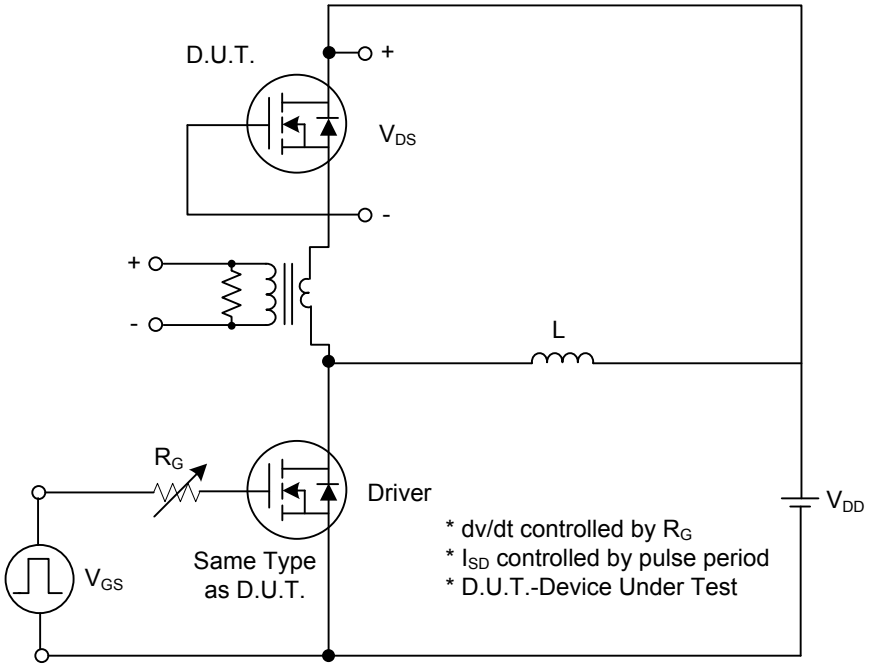


Unclamped Inductive Switching Test Circuit

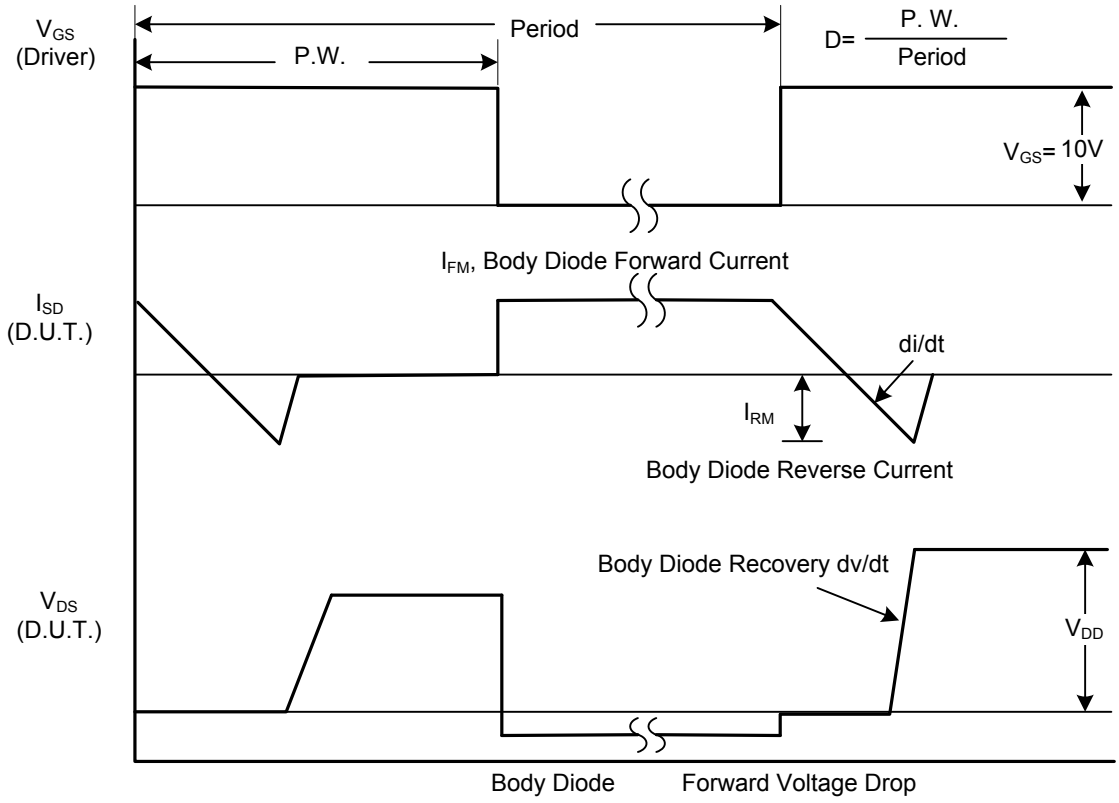


Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS(Cont.)



Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

■ TYPICAL CHARACTERISTICS