

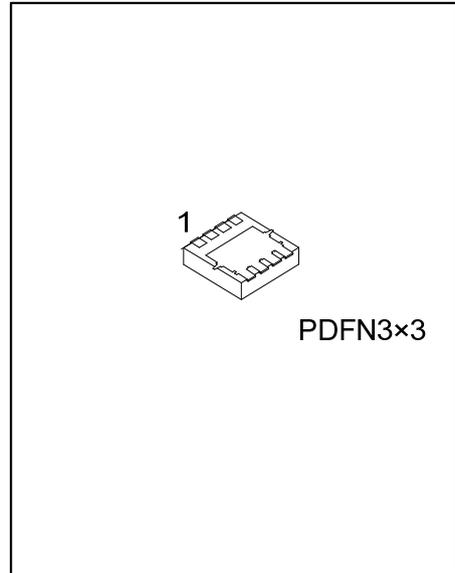


**UT40N04HZ**

Preliminary

*Power MOSFET*

**40A, 40V N-CHANNEL  
ENHANCEMENT MODE  
TRENCH POWER MOSFET**



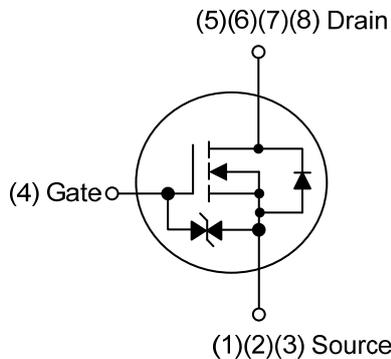
■ DESCRIPTION

The UTC **UT40N04HZ** is a N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

■ FEATURES

- \*  $R_{DS(ON)} \leq 10 \text{ m}\Omega @ V_{GS}=10V, I_D=20A$
- \* Low drain-source on-resistance
- \* Low leakage current?
- \* Enhancement mode
- \* With ESD Protected

■ SYMBOL



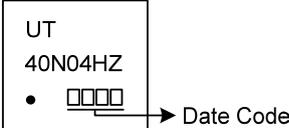
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment						Packing		
Lead Free	Halogen Free		1	2	3	4	5	6		7	8
UT40N04HZL-P3030-R	UT40N04HZG-P3030-R	PDFN3x3	S	S	S	G	D	D	D	D	Tape Reel

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

<p>UT40N04HZG-P3030-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) P3030: PDFN3x3</p> <p>(3) G: Halogen Free and Lead Free, K: Lead Free</p>
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■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	40	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Drain Current	Continuous	$I_D$	40	A
	Pulsed (Note 2)	$I_{DM}$	80	A
Single Pulsed Avalanche Energy (Note 3)		$E_{AS}$	60	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.9	V/ns
Power Dissipation		$P_D$	22	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. Repetitive Rating: Pulse width limited by maximum junction temperature.

3.  $L = 0.1\text{mH}$ ,  $I_{AS} = 34.6\text{A}$ ,  $V_{DD} = 20\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^{\circ}\text{C}$

4.  $I_{SD} \leq 30\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ ,  $T_J \leq T_{JMAX}$ ,  $T_J = 25^{\circ}\text{C}$ .

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	75	$^{\circ}\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	5.68	$^{\circ}\text{C}/\text{W}$

Note: Device mounted on FR-4 substrate  $P_c$  board, 2oz copper, with 1inch square copper plate.

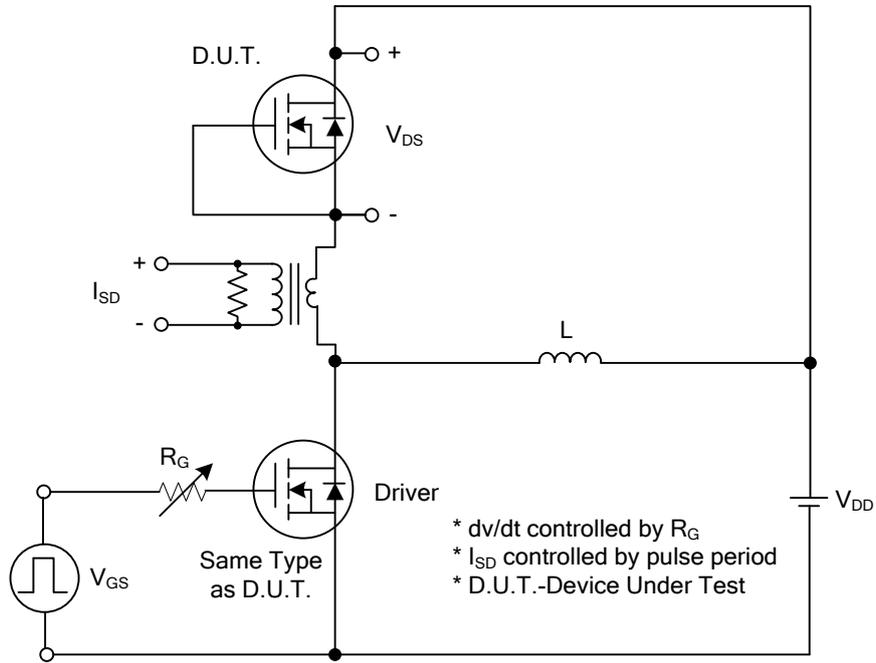
■ ELECTRICAL CHARACTERISTICS ( $T_J=25^{\circ}\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>OFF CHARACTERISTICS</b>								
Drain-Source Breakdown Voltage		$BV_{DSS}$	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	40			V	
Drain-Source Leakage Current		$I_{DSS}$	$V_{DS}=40\text{V}$ , $V_{GS}=0\text{V}$			1	$\mu\text{A}$	
Gate-Source Leakage Current	Forward	$I_{GSS}$	$V_{GS}=+20\text{V}$ , $V_{DS}=0\text{V}$			+10	$\mu\text{A}$	
	Reverse		$V_{GS}=-20\text{V}$ , $V_{DS}=0\text{V}$			-10	$\mu\text{A}$	
<b>ON CHARACTERISTICS</b>								
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-State Resistance		$R_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=20\text{A}$			10	m $\Omega$	
<b>DYNAMIC PARAMETERS</b>								
Input Capacitance		$C_{ISS}$	$V_{DS}=25\text{V}$ , $V_{GS}=0\text{V}$ , $f=1.0\text{MHz}$		1412		pF	
Output Capacitance		$C_{OSS}$				184		pF
Reverse Transfer Capacitance		$C_{RSS}$				152		pF
<b>SWITCHING PARAMETERS</b>								
Total Gate Charge		$Q_G$	$V_{DS}=32\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=40\text{A}$		47		nC	
Gate to Source Charge		$Q_{GS}$				5		nC
Gate to Drain Charge		$Q_{GD}$				20		nC
Turn-ON Delay Time		$t_{D(ON)}$	$V_{DD}=20\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=40\text{A}$ , $R_G=3\Omega$		7		ns	
Rise Time		$t_R$				17		ns
Turn-OFF Delay Time		$t_{D(OFF)}$				130		ns
Fall-Time		$t_F$				71		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>								
Maximum Body-Diode Continuous Current		$I_S$				40	A	
Maximum Body-Diode Pulsed Current		$I_{SM}$				80	A	
Drain-Source Diode Forward Voltage		$V_{SD}$	$I_{SD}=40\text{A}$			1.4	V	
Body Diode Reverse Recovery Time		$t_{rr}$	$I_S=30\text{A}$ , $di/dt=100\text{A}/\mu\text{s}$			56	ns	
Body Diode Reverse Recovery Charge		$Q_{rr}$				57		nC

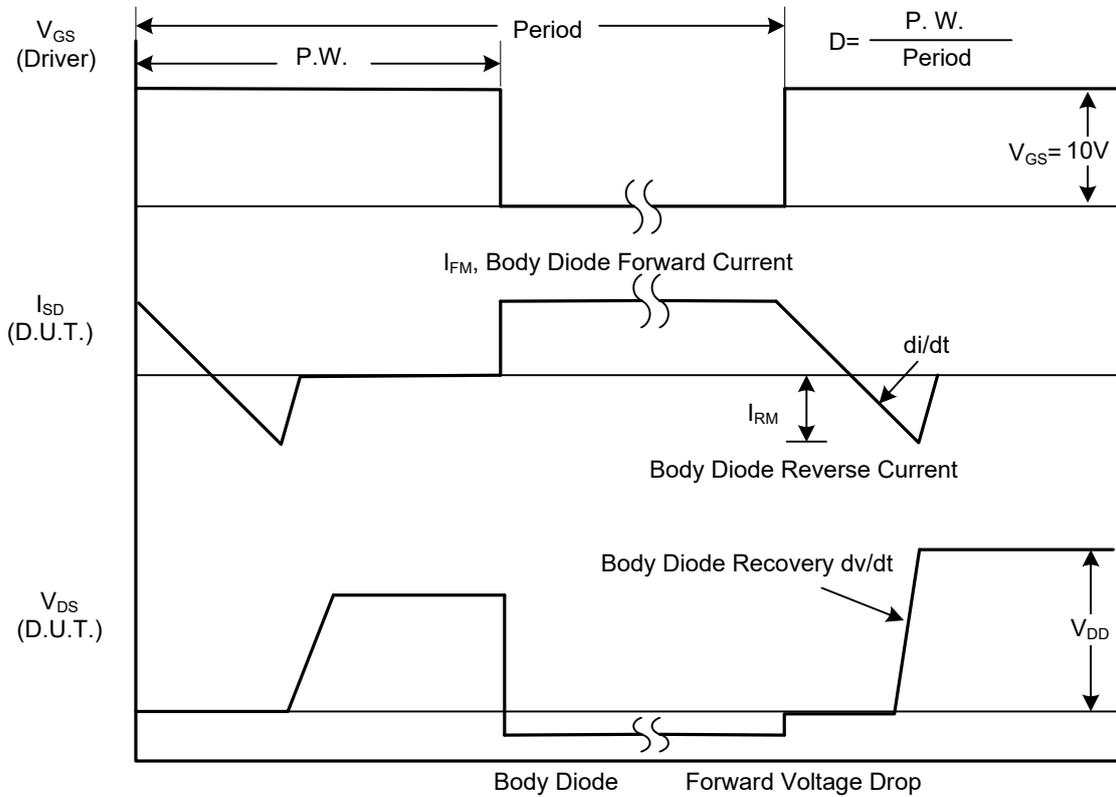
Notes: 1. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

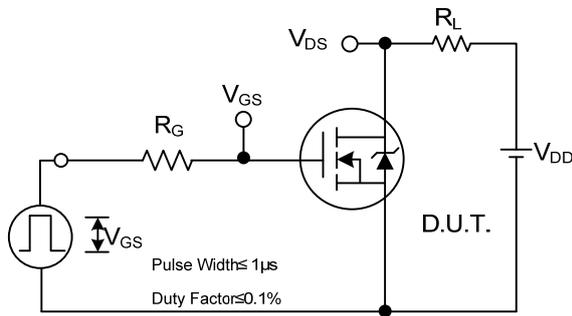


Peak Diode Recovery dv/dt Test Circuit

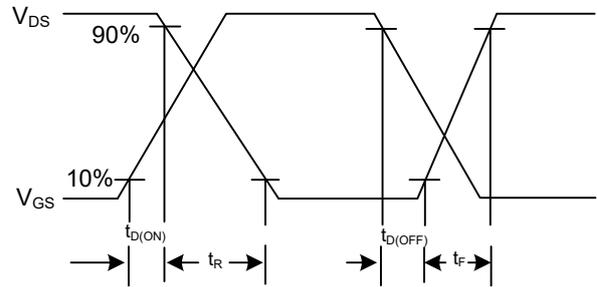


Peak Diode Recovery dv/dt Waveforms

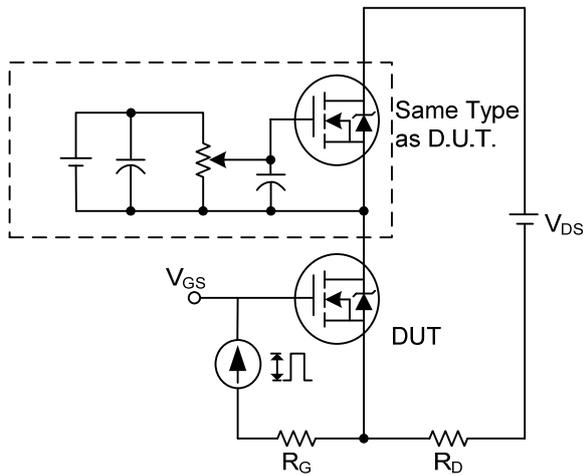
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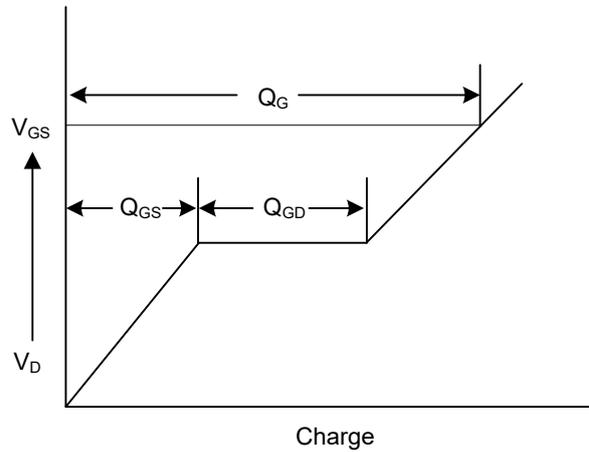
Switching Test Circuit



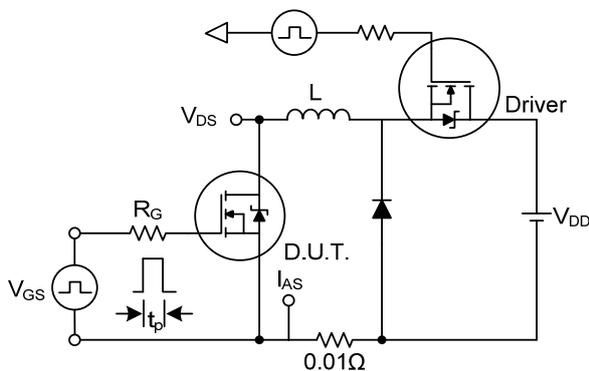
Switching Waveforms



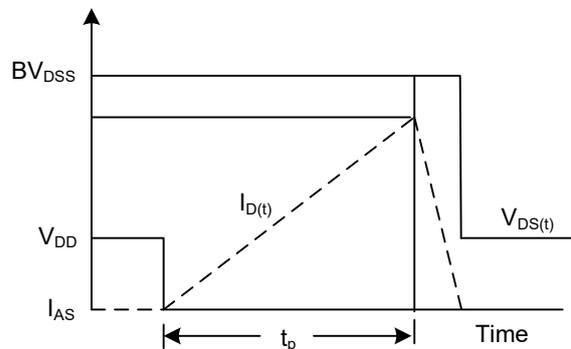
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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