



## UF9640Z

Power MOSFET

### -11A, -200V P-CHANNEL POWER MOSFET

#### DESCRIPTION

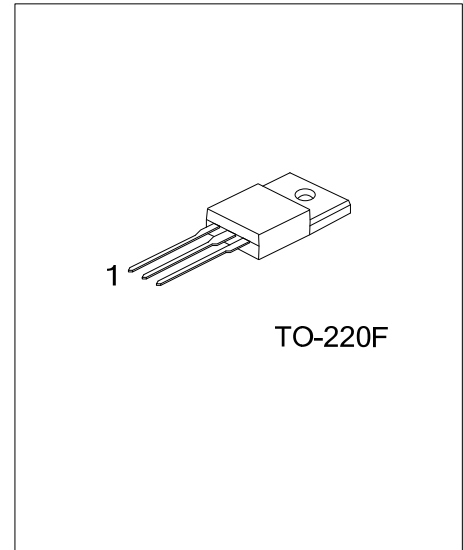
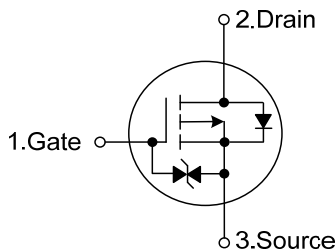
The **UF9640Z** is a P-channel Power MOSFET that developed by UTC's advanced technology. The device has an advantage of including fast switching, low on-resistance, ruggedized device design and low cost-effectiveness.

This type of package is generally applied in applications in the commercial-industrial field especially suitable for the power consumption at approximately 50W. Because of its low package cost and low thermal resistance, this package is widely applied in the industry field.

#### FEATURES

- \* Fast switching speed
- \* Repetitive avalanche rated
- \* Simple drive requirements
- \* Ease of paralleling

#### SYMBOL



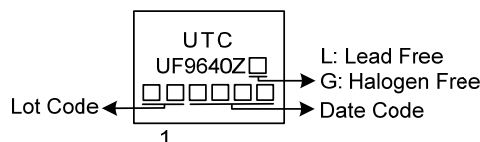
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UF9640ZL-TF3-T	UF9640ZG-TF3-T	TO-220F	G	D	S	Tube

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

<p>UF9640ZG-TF3-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube (2) TF3: TO-220F (3) G: Halogen Free and Lead Free, L: Lead Free</p>
--	---

#### MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Gate to Source Voltage		$V_{GSS}$	$\pm 20$	V
Drain Current	Continuous	$I_D$	-11	A
	Pulsed (Note 1)	$I_{DM}$	-22	A
Avalanche Energy	Single Pulsed (Note 2)	$E_{AS}$	35	mJ
	Repetitive (Note 1)	$E_{AR}$	13	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	1.2	V/ns
Power Dissipation		$P_D$	38	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.  $L=12\text{mH}$ ,  $I_{AS}=-2.4\text{A}$ ,  $V_{DD}=-50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J = 25^{\circ}\text{C}$ .  
 4.  $I_{SD}\leq -11\text{A}$ ,  $di/dt\leq 200\text{A}/\mu\text{s}$ ,  $V_{DD}\leq BV_{DSS}$ , Starting  $T_J=25^{\circ}\text{C}$ .

■ THERMAL DATA

PARAMETER	SYMBOL	PATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	62.5	$^{\circ}\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	3.31	$^{\circ}\text{C}/\text{W}$

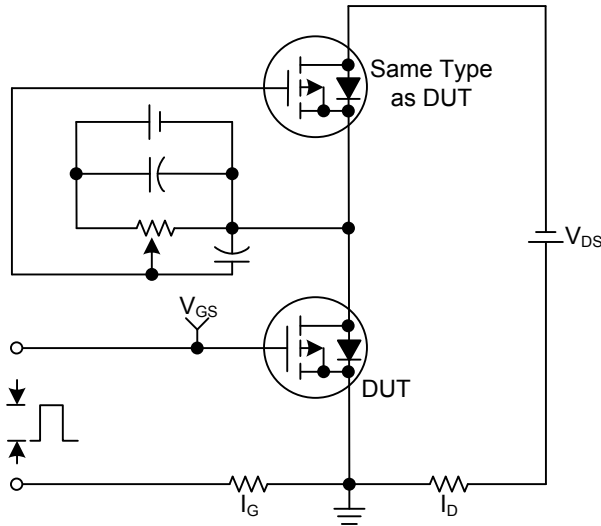
■ ELECTRICAL CHARACTERISTICS ( $T_J=25^{\circ}\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{V}$ , $I_D=-250\mu\text{A}$	-200			V	
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=-200\text{V}$ , $V_{GS}=0\text{V}$			-10	$\mu\text{A}$	
Gate-Source Leakage Current	Forward Reverse	$I_{GSS}$			+20V	10	$\mu\text{A}$
					-20V	-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	
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10\text{V}$ , $I_D=-6.6\text{A}$ (Note 2)			0.5	$\Omega$	
<b>DYNAMIC PARAMETERS</b>							
Input Capacitance	$C_{ISS}$	$V_{DS}=-25\text{V}$ , $V_{GS}=0\text{V}$ , $f=1.0\text{MHz}$		770		pF	
Output Capacitance	$C_{OSS}$			185		pF	
Reverse Transfer Capacitance	$C_{RSS}$			20		pF	
<b>SWITCHING PARAMETERS</b>							
Total Gate Charge	$Q_G$	$V_{DS}=-50\text{V}$ , $V_{GS}=-10\text{V}$ , $I_D=-1.3\text{A}$ , $I_G=-100\text{mA}$ (Note 2)		7.0		nC	
Gate-Source Charge	$Q_{GS}$			6.8		nC	
Gate-Drain Charge	$Q_{GD}$			8.4		nC	
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=-50\text{V}$ , $V_{GS}=-10\text{V}$ , $I_D=-5\text{A}$ , $R_G=25\Omega$ (Note 2)		11		ns	
Turn-ON Rise Time	$t_R$			19		ns	
Turn-OFF Delay Time	$t_{D(OFF)}$			58		ns	
Turn-OFF Fall Time	$t_F$			25		ns	
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>							
Maximum Body-Diode Continuous Current	$I_S$				-11	A	
Maximum Body-Diode Pulsed Current	$I_{SM}$				-22	A	
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_S=-11\text{A}$ , $V_{GS}=0\text{V}$ , $T_J=25^{\circ}\text{C}$			-5.0	V	
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F=-11\text{A}$ , $T_J=25^{\circ}\text{C}$		260		ns	
Body Diode Reverse Recovery Charge	$Q_{rr}$	$di/dt=100\text{A}/\mu\text{s}$ (Note 2)		1.6		$\mu\text{C}$	

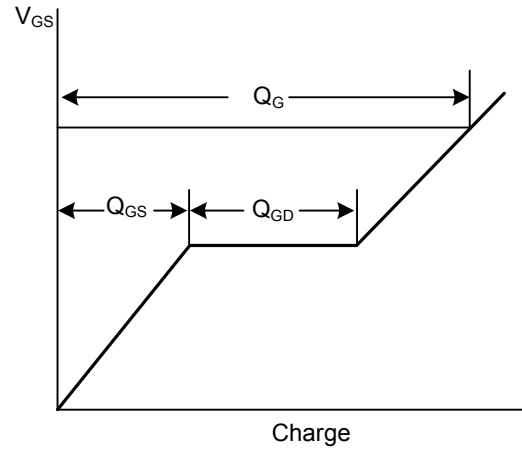
- Notes: 1. Pulse width limited by maximum junction temperature.  
 2. Pulse Test : Pulse width $\leq 300\mu\text{s}$ , Duty cycle $\leq 2\%$

## ■ TEST CIRCUITS AND WAVEFORMS

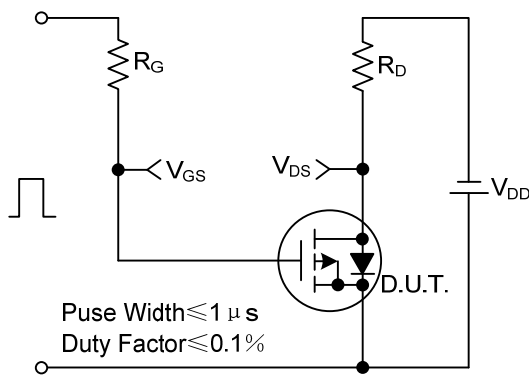
Gate Charge Test Circuit



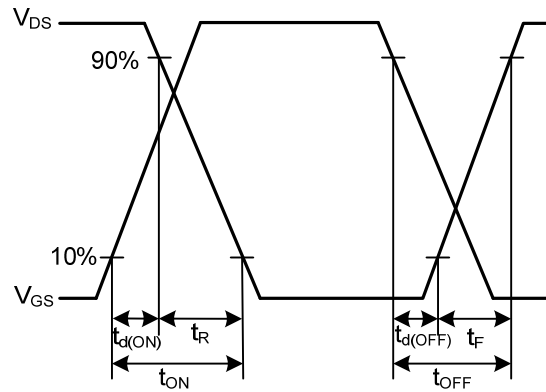
Gate Charge Waveforms



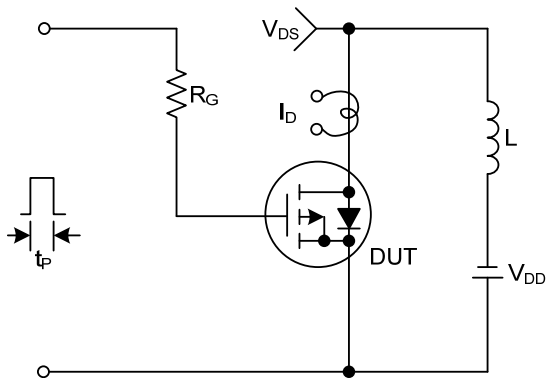
Resistive Switching Test Circuit



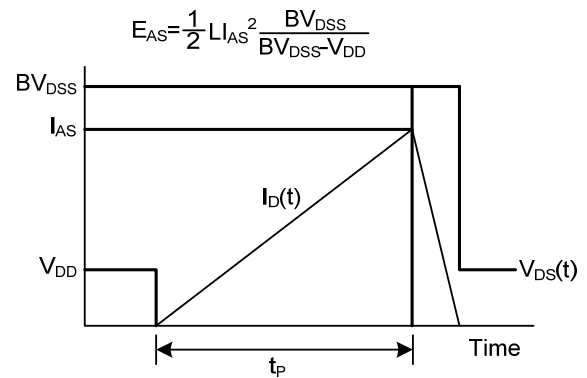
Resistive Switching Waveforms



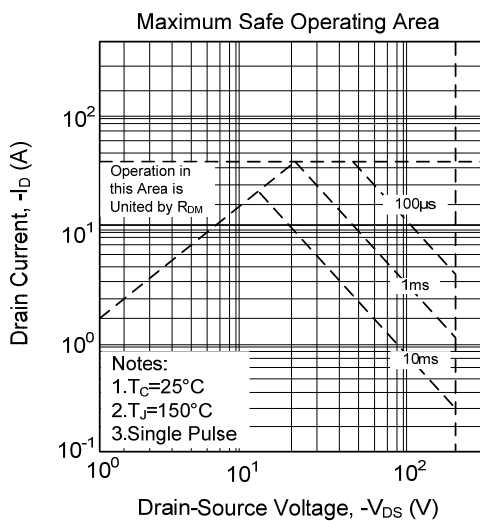
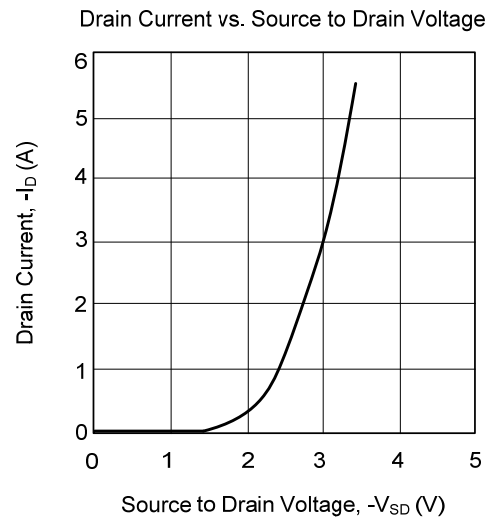
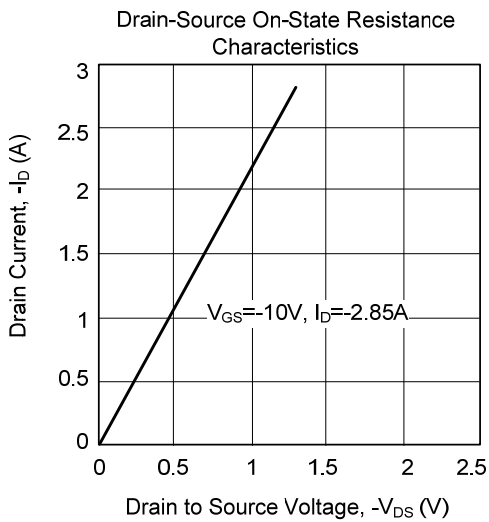
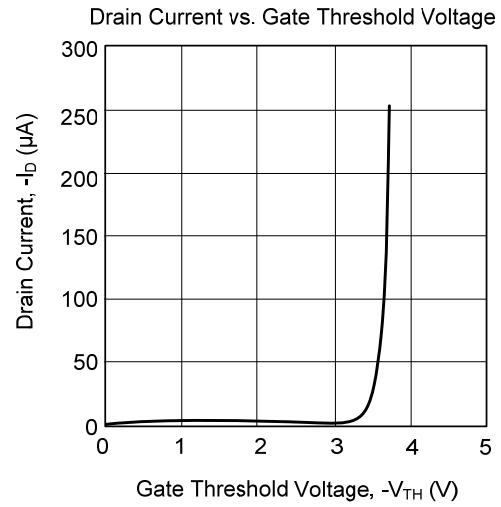
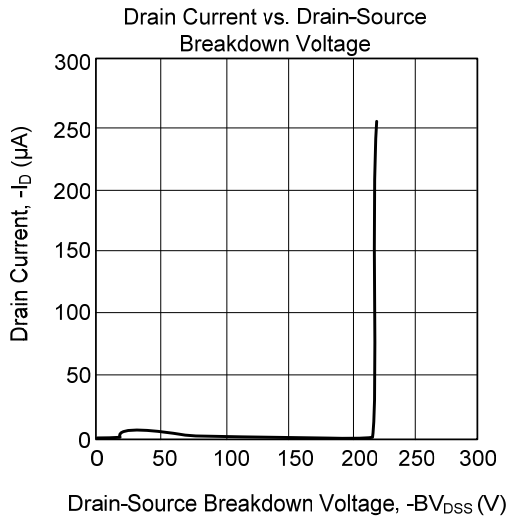
Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



## ■ TYPICAL CHARACTERISTICS



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.