



## 3P40

Power MOSFET

### 3.0A, 400V P-CHANNEL POWER MOSFET

#### DESCRIPTION

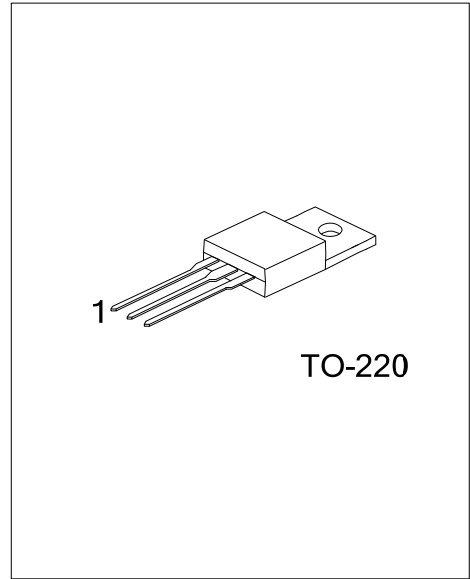
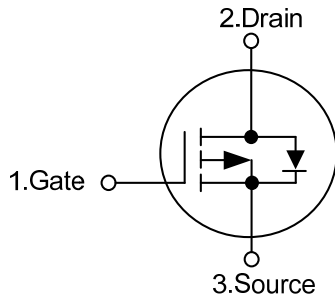
The UTC **3P40** is a P-channel MOS Field Effect Transistor. it uses UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance.

The UTC **3P40** is suitable for high voltage switching applications.

#### FEATURES

- \*  $R_{DS(ON)} \leq 3.8 \Omega @ V_{GS} = -10V, I_D = -1.5A$
- \* Low capacitance
- \* Low gate charge
- \* Fast switching capability
- \* Avalanche energy specified

#### SYMBOL



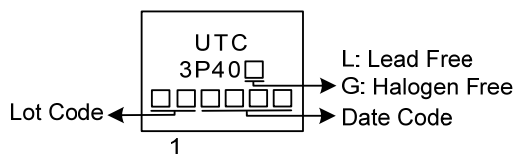
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
3P40L-TA3-T	3P40G-TA3-T	TO-220	G	D	S	Tube

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

<p>3P40G-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube</p> <p>(2) TA3: TO-220</p> <p>(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
Drain-Source Voltage		$V_{DSS}$	-400	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Continuous Drain Current	Continuous	$I_D$	-3	A
Pulsed Drain Current	Pulsed (Note 2)	$I_{DM}$	-6	A
Single Pulsed Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	400	mJ
Peak Diode Recovery $dv/dt$ (Note 4)		$dv/dt$	6	V/ns
Power Dissipation		$P_D$	70	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.  $L = 100\text{mH}$ ,  $I_{AS} = -2.8\text{A}$ ,  $V_{DD} = -90\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$

4.  $I_{SD} \leq -3.0\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	1.79	$^\circ\text{C}/\text{W}$

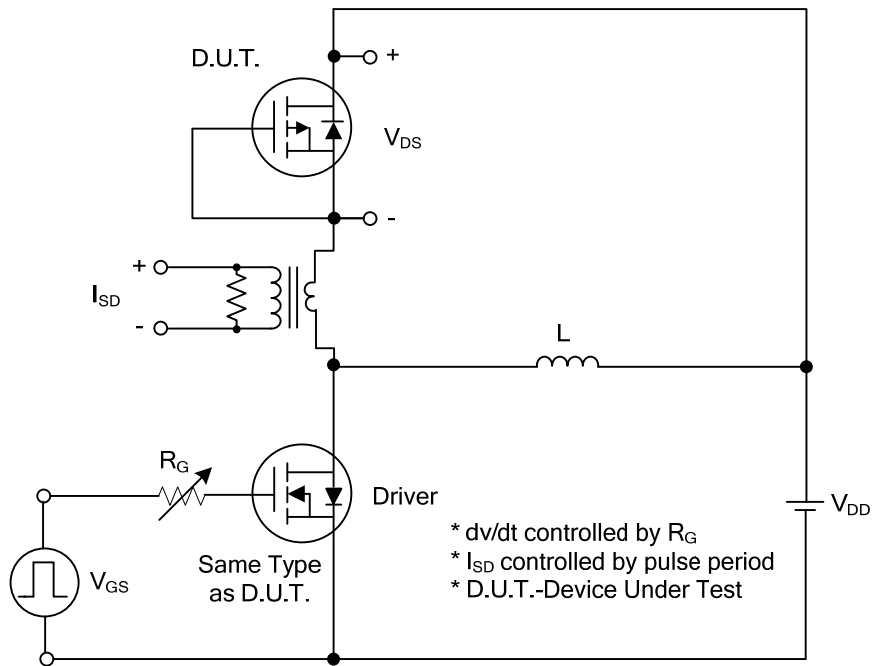
■ ELECTRICAL CHARACTERISTICS ( $T_J=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0\text{V}$ , $I_D=-250\mu\text{A}$	-400			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=-400\text{V}$ , $V_{GS}=0\text{V}$			-1	$\mu\text{A}$
Gate-Source Leakage Current	Forward	$I_{GSS}$ $V_{DS}=0\text{V}$ , $V_{GS}=+30\text{V}$ $V_{DS}=0\text{V}$ , $V_{GS}=-30\text{V}$			100	nA
	Reverse				-100	nA
<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-Resistance	$R_{DS(ON)}$	$V_{GS}=-10\text{V}$ , $I_D=-1.5\text{A}$			3.8	$\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=-25\text{V}$ , $V_{GS}=0\text{V}$ , $f=1.0\text{MHz}$		619		pF
Output Capacitance	$C_{OSS}$			81		pF
Reverse Transfer Capacitance	$C_{RSS}$			13		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge (Note 1)	$Q_G$	$V_{DS}=-48\text{V}$ , $V_{GS}=-10\text{V}$ , $I_D=-3\text{A}$ (Note 1, 2)		21		nC
Gate Source Charge	$Q_{GS}$			6		nC
Gate Drain Charge	$Q_{GD}$			6		nC
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$	$V_{DD}=-30\text{V}$ , $V_{GS}=-10\text{V}$ , $I_D=-3\text{A}$ , $R_G=25\Omega$ (Note 1, 2)		6		ns
Turn-ON Rise Time	$t_R$			21		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			60		ns
Turn-OFF Fall-Time	$t_F$			27		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	$I_S$				-3.0	A
Diode Forward Voltage (Note 1)	$V_{SD}$	$I_S=-3.0\text{A}$ , $V_{GS}=0\text{V}$			-1.4	V
Body Diode Reverse Recovery Time (Note 1)	$t_{rr}$	$I_S=-3.0\text{A}$ , $V_{GS}=0\text{V}$ ,		186		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$	$dI_F/dt=100\text{A}/\mu\text{s}$		1.3		$\mu\text{C}$

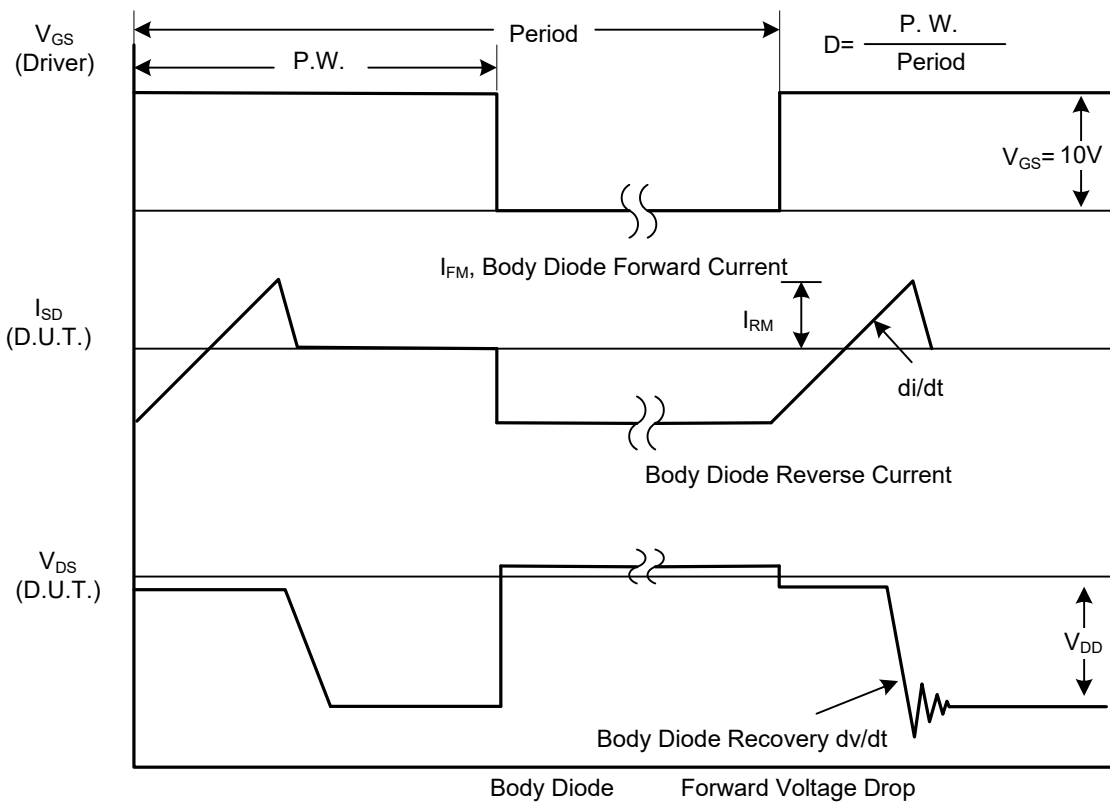
Notes: 1. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

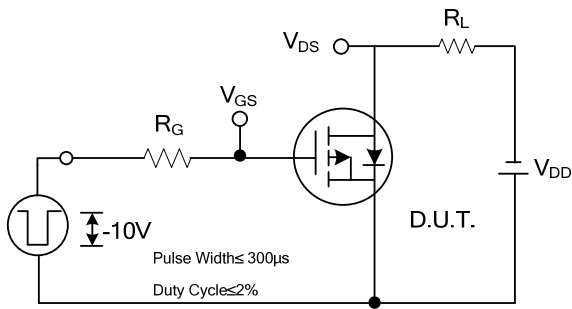


Peak Diode Recovery  $dv/dt$  Test Circuit

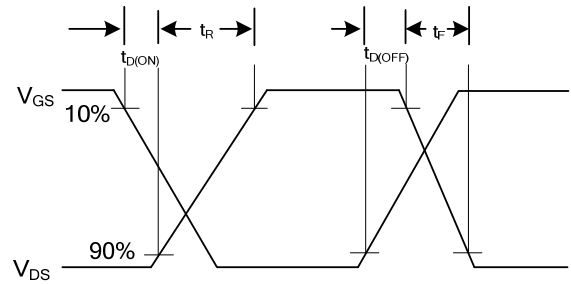


Peak Diode Recovery  $dv/dt$  Waveforms

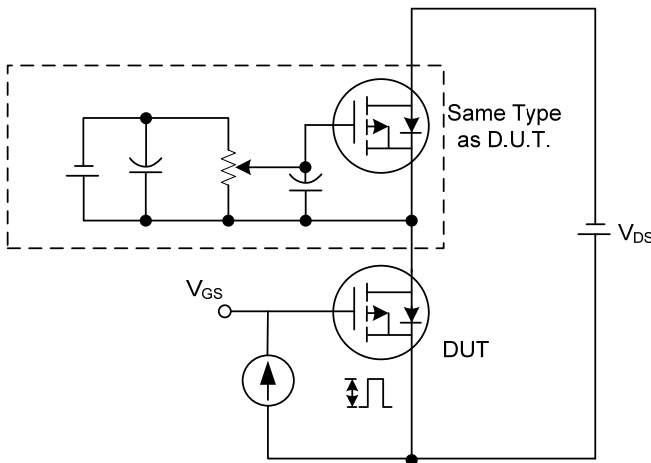
■ TEST CIRCUITS AND WAVEFORMS



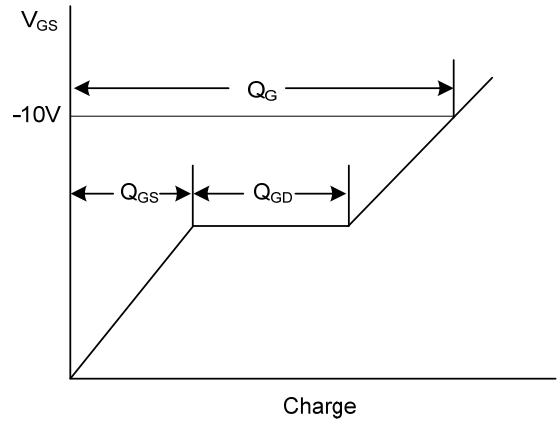
Switching Test Circuit



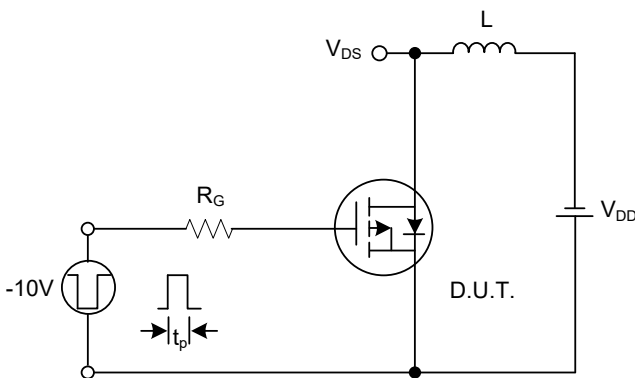
Switching Waveforms



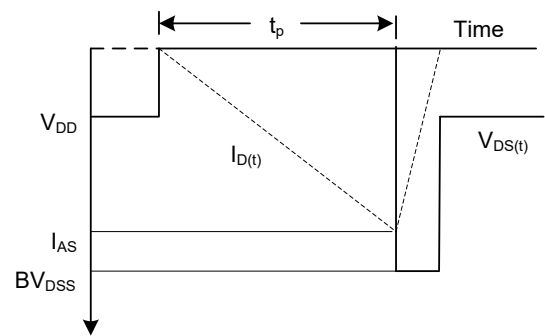
Gate Charge Test Circuit



Gate Charge Waveform

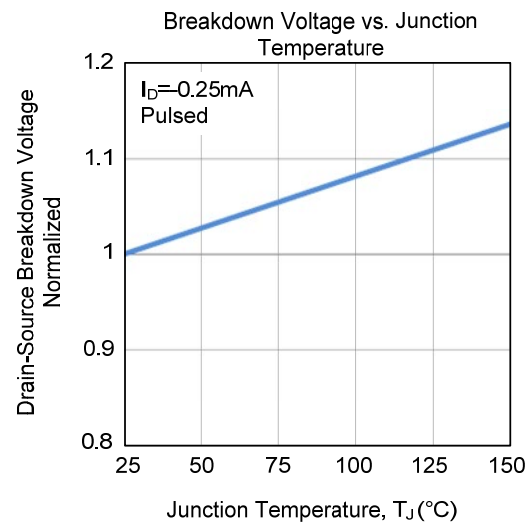
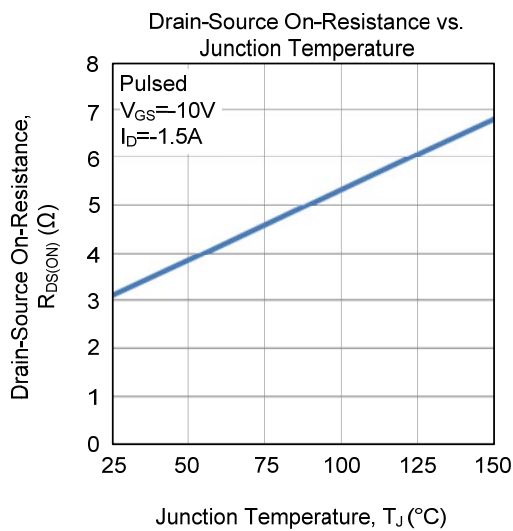
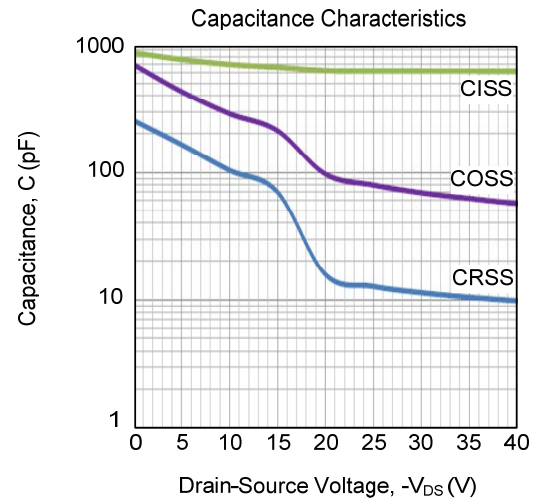
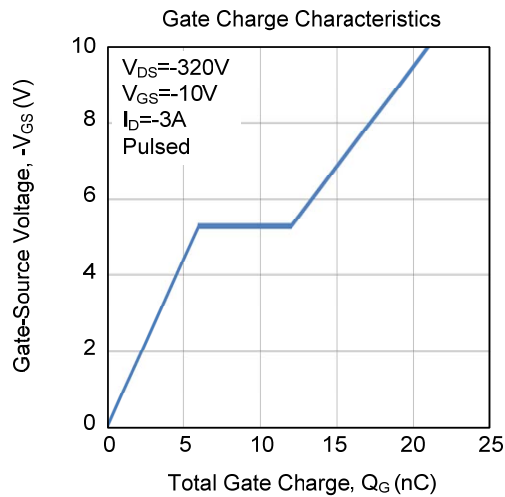
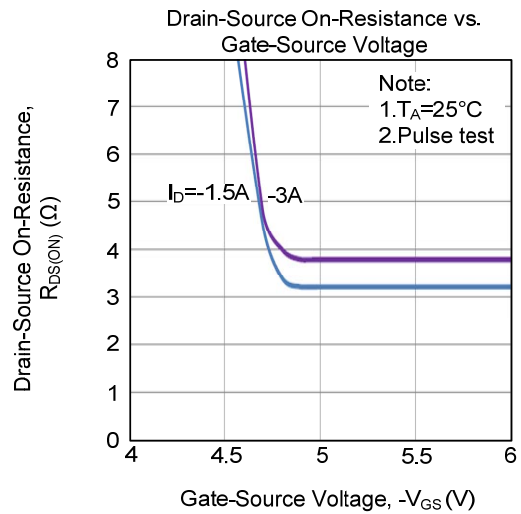
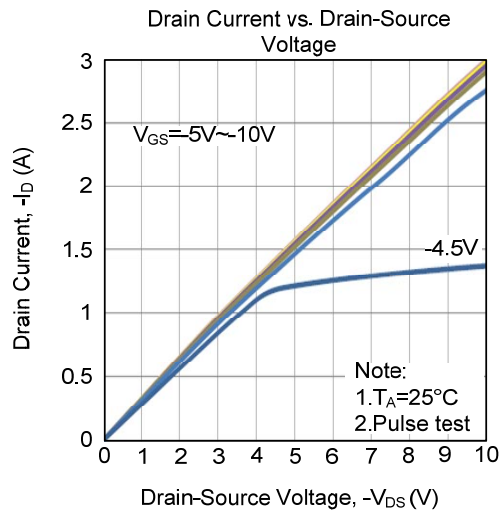


Unclamped Inductive Switching Test Circuit

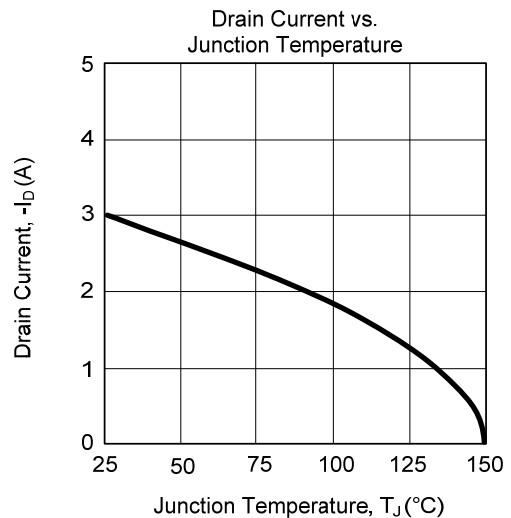
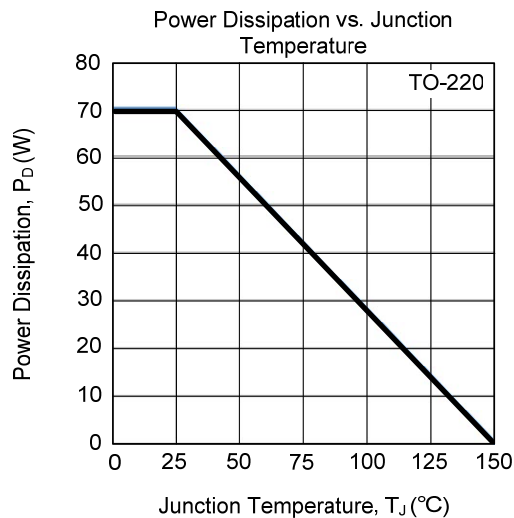
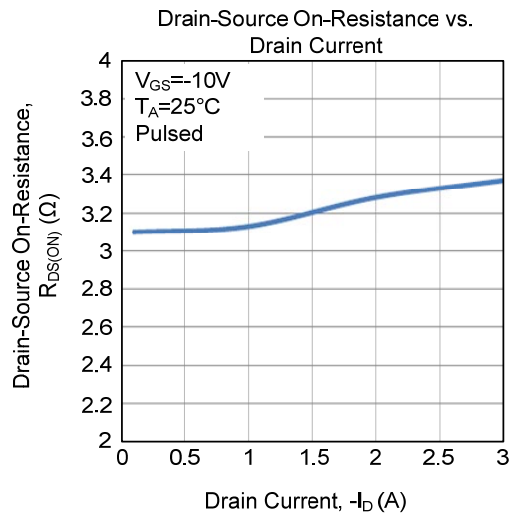
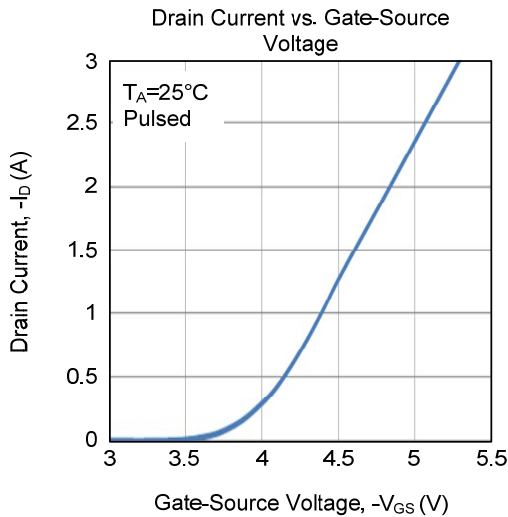
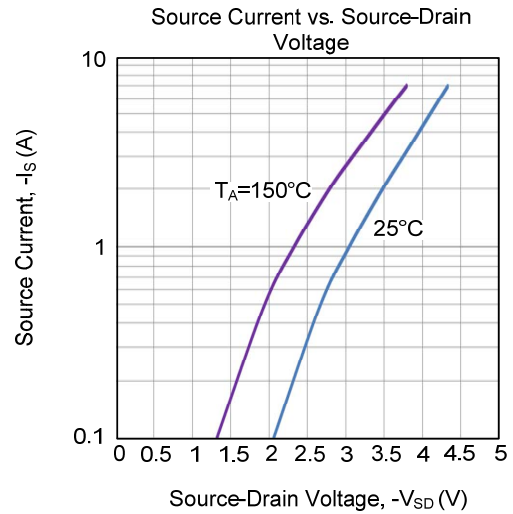
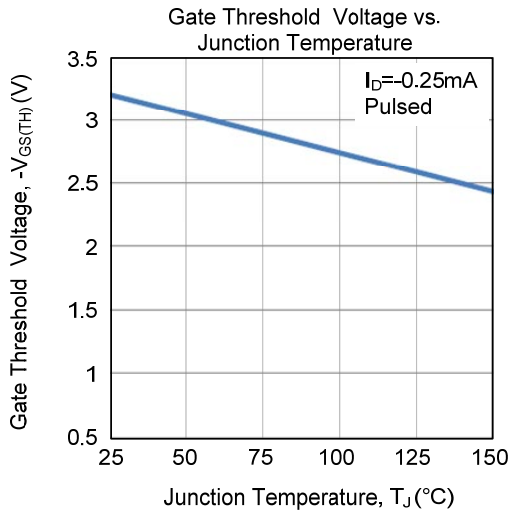


Unclamped Inductive Switching Waveforms

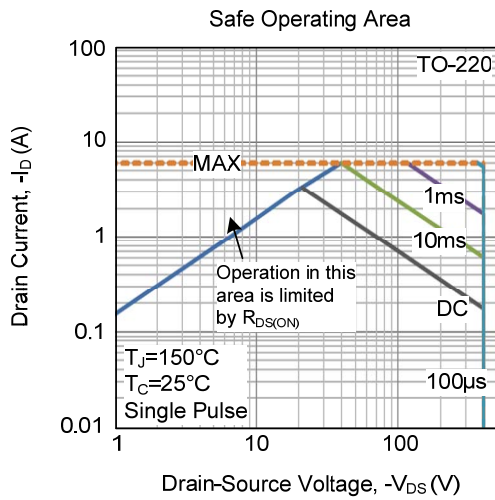
## TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS (Cont.)



## ■ TYPICAL CHARACTERISTICS (Cont.)



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.