



UTT50P10

Power MOSFET

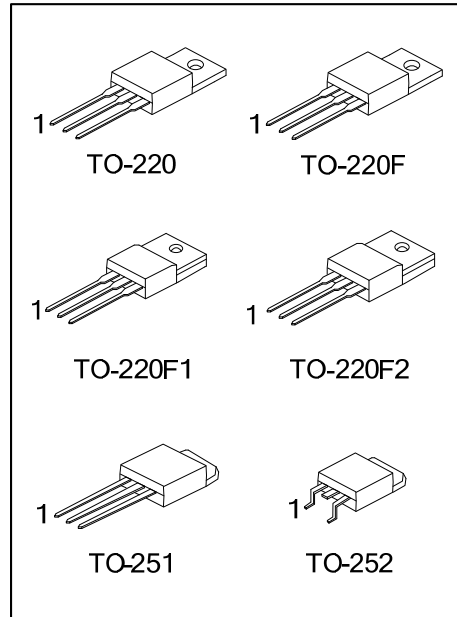
-50A, -100V P-CHANNEL POWER MOSFET

DESCRIPTION

The UTC **UTT50P10** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance. It can also withstand high energy in the avalanche.

FEATURES

- * $V_{DS} = -100V$
- * $I_D = -50A$
- * $R_{DS(ON)} \leq 60\ m\Omega$ @ $V_{GS} = -10V, I_D = -20A$
- $R_{DS(ON)} \leq 75\ m\Omega$ @ $V_{GS} = -4.5V, I_D = -15A$
- * High Switching Speed



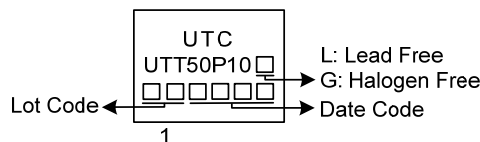
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTT50P10L-TA3-T	UTT50P10G-TA3-T	TO-220	G	D	S	Tube
UTT50P10L-TF1-T	UTT50P10G-TF1-T	TO-220F1	G	D	S	Tube
UTT50P10L-TF2-T	UTT50P10G-TF2-T	TO-220F2	G	D	S	Tube
UTT50P10L-TF3-T	UTT50P10G-TF3-T	TO-220F	G	D	S	Tube
UTT50P10L-TM3-T	UTT50P10G-TM3-T	TO-251	G	D	S	Tube
UTT50P10L-TN3-R	UTT50P10G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>UTT50P10G-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TM3: TO-251, TN3: TO-252</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}	-100	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current	Continuous	I_D	-50	A
	Pulsed	I_{DM}	-90	A
Avalanche energy	Single Pulsed (Note 3)	E_{AS}	90	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.1	V/ns
Power Dissipation	TO-220	P_D	110	W
	TO-220F/TO-220F1		34	W
	TO-220F2		50	W
	TO-251/TO-252			
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. $L=0.1\text{mH}$, $I_{AS}=-42\text{A}$, $V_{DD}=-50\text{V}$, $R_G=25\Omega$, Starting $T_J = 25^\circ\text{C}$

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

■ THERMAL DATA

PARAMETER	PACKAGE	SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-220F1/TO-220F2			
	TO-251/TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.13	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		3.68	$^\circ\text{C}/\text{W}$
	TO-220F2			
	TO-251/TO-252		2.5	$^\circ\text{C}/\text{W}$

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

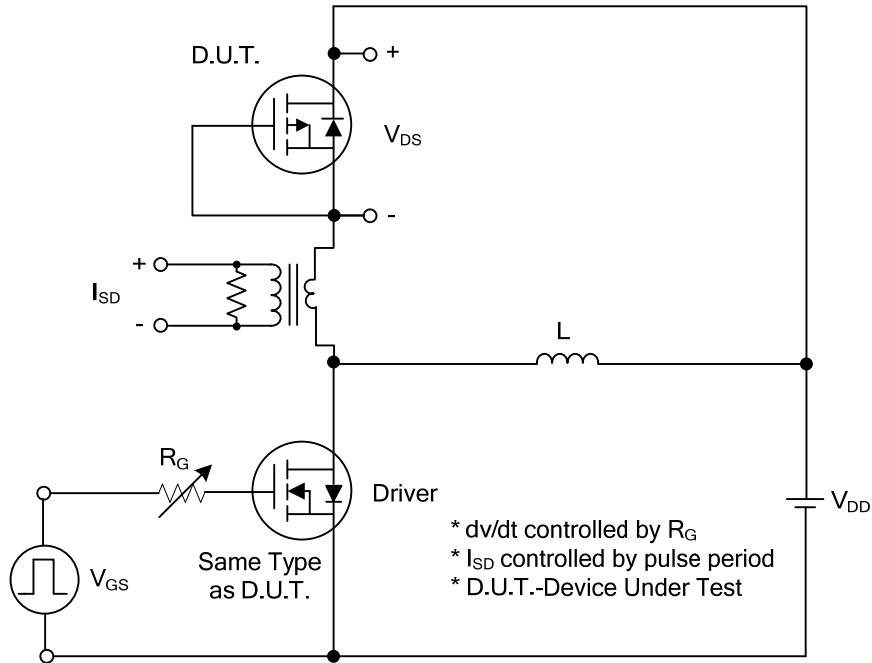
■ ELECTRICAL CHARACTERISTICS ($T_c=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$	-100			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=-100\text{V}$, $V_{GS}=0\text{V}$			-1	μA
Gate- Source Leakage Current	Forward	I_{GSS} $V_{GS}=+20\text{V}$, $V_{DS}=0\text{V}$			+100	nA
	Reverse		$V_{GS}=-20\text{V}$, $V_{DS}=0\text{V}$			-100
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-1.0		-3.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10\text{V}$, $I_D=-20\text{A}$			60	$\text{m}\Omega$
		$V_{GS}=-4.5\text{V}$, $I_D=-15\text{A}$			75	$\text{m}\Omega$
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS}=0\text{V}$, $V_{DS}=-25\text{V}$, $f=1.0\text{MHz}$		4760		pF
Output Capacitance	C_{OSS}			225		pF
Reverse Transfer Capacitance	C_{RSS}			170		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{DS}=-80\text{V}$, $V_{GS}=-10\text{V}$, $I_D=-50\text{A}$ (Note 1)		70		nC
Gate to Source Charge	Q_{GS}			17		nC
Gate to Drain Charge	Q_{GD}			15		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=-50\text{V}$, $V_{GS}=-10\text{V}$, $I_D=-50\text{A}$, $R_G=3\Omega$ (Note 1)		12		ns
Rise Time	t_R			20		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			67		ns
Fall-Time	t_F			27		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	$I_F=-20\text{A}$, $V_{GS}=0\text{V}$, Pulse test, $t\leq 300\mu\text{s}$, duty cycle $d\leq 2\%$			-2.0	V
Body Diode Reverse Recovery Time	t_{RR}	$I_F=-30\text{A}$, $di/dt=100\text{A}/\mu\text{s}$		57		ns
Body Diode Reverse Recovery Charge	Q_{RR}				107	

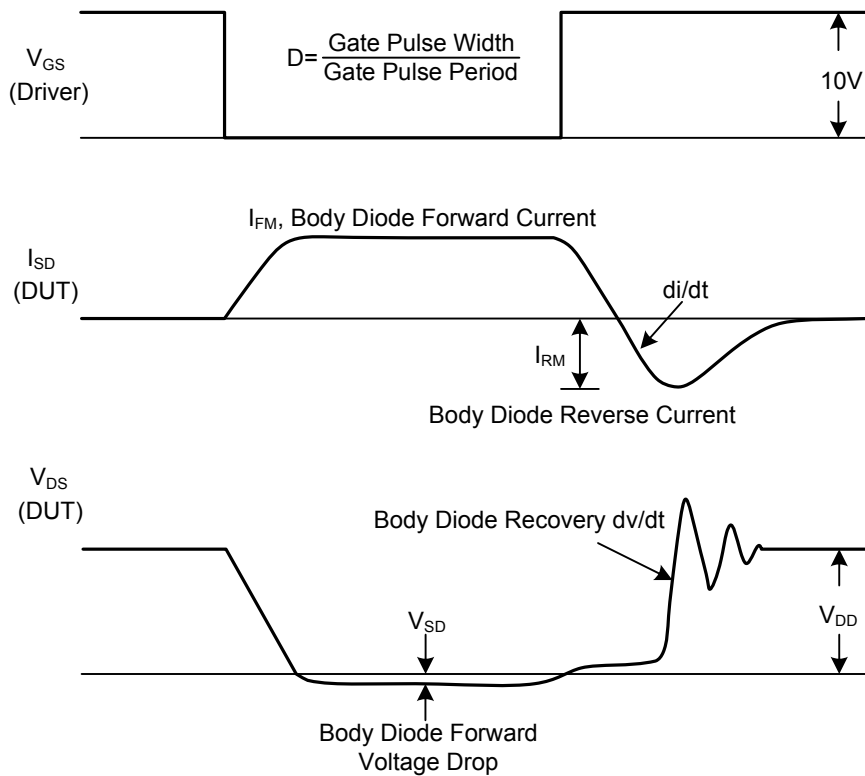
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS



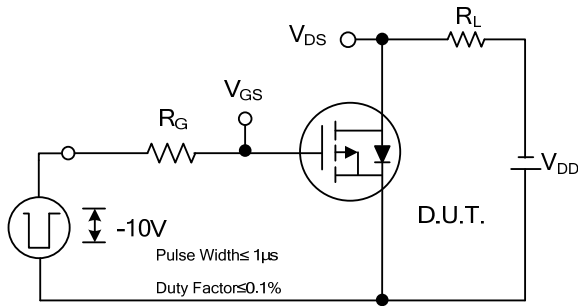
Peak Diode Recovery dv/dt Test Circuit



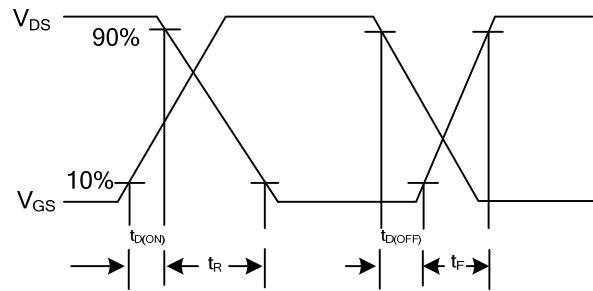
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

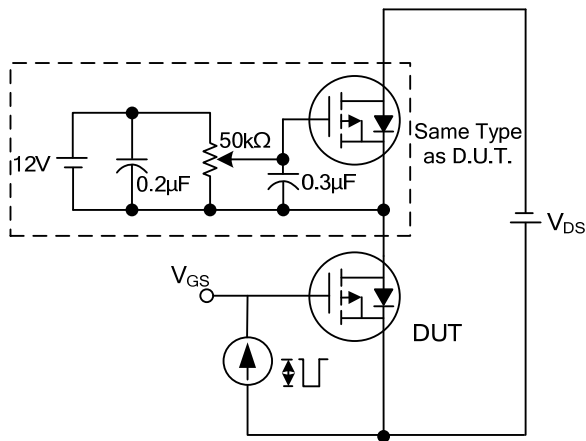
TEST CIRCUITS AND WAVEFORMS



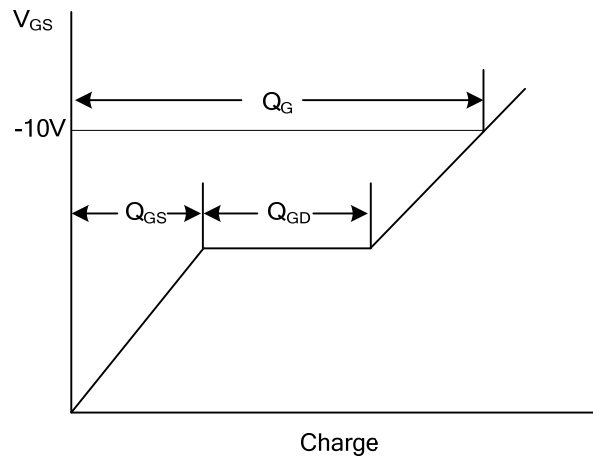
Switching Test Circuit



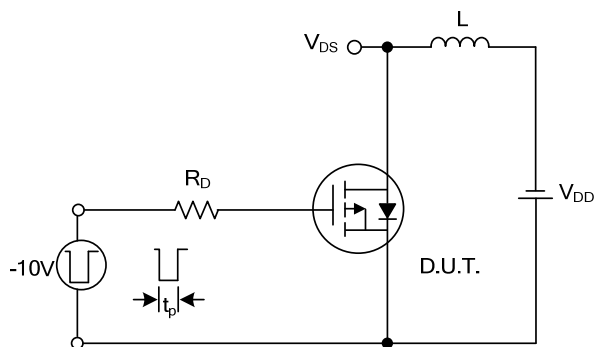
Switching Waveforms



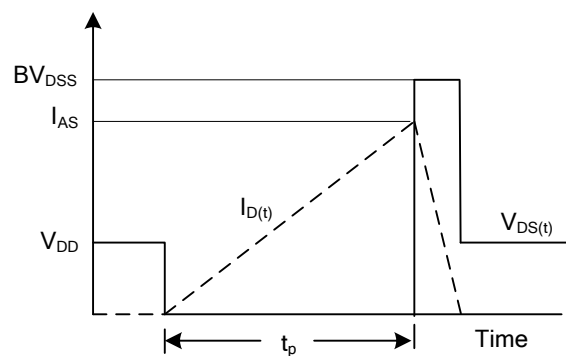
Gate Charge Test Circuit



Gate Charge Waveform

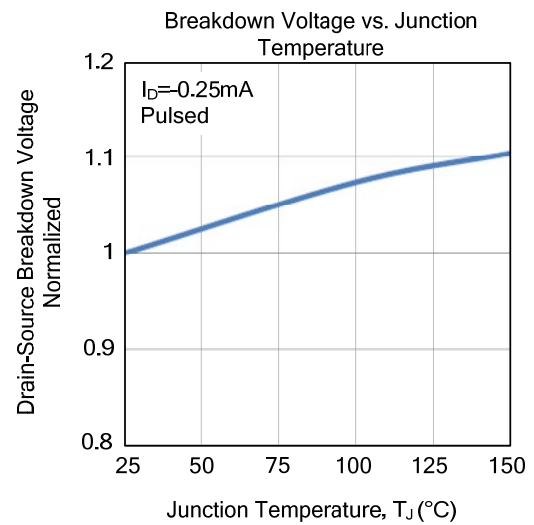
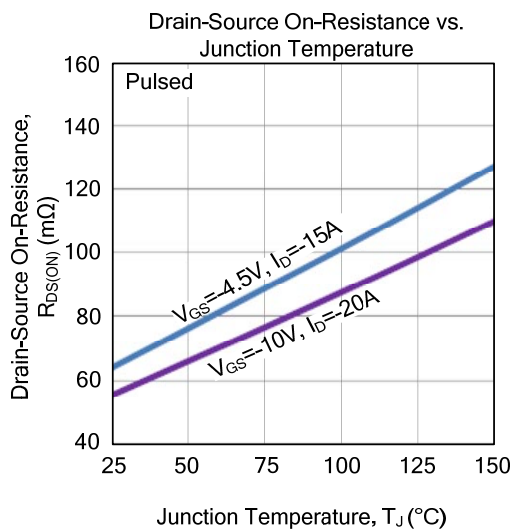
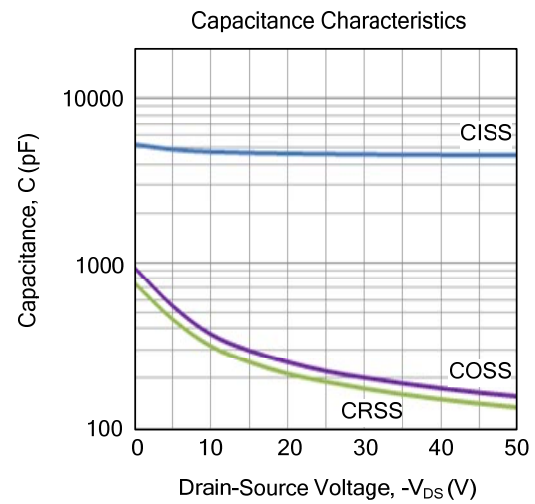
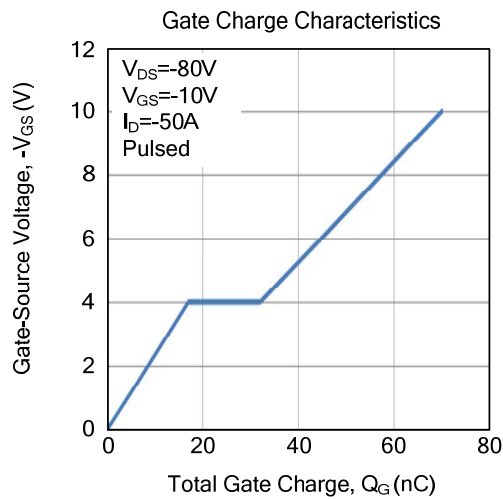
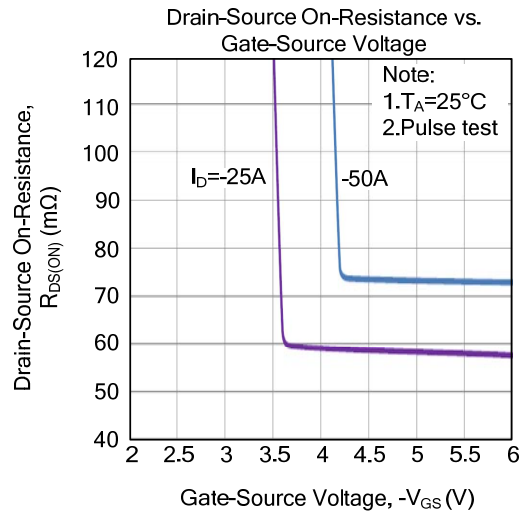
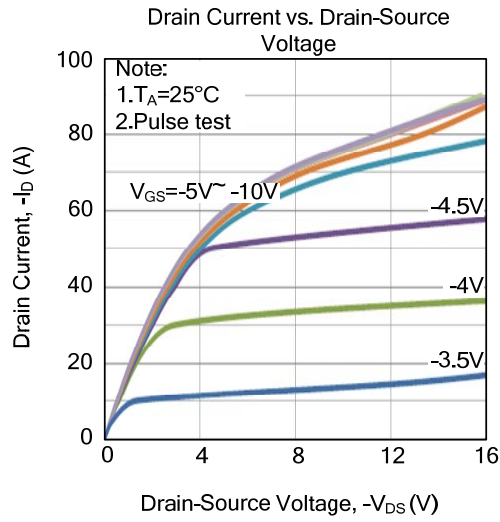


Unclamped Inductive Switching Test Circuit

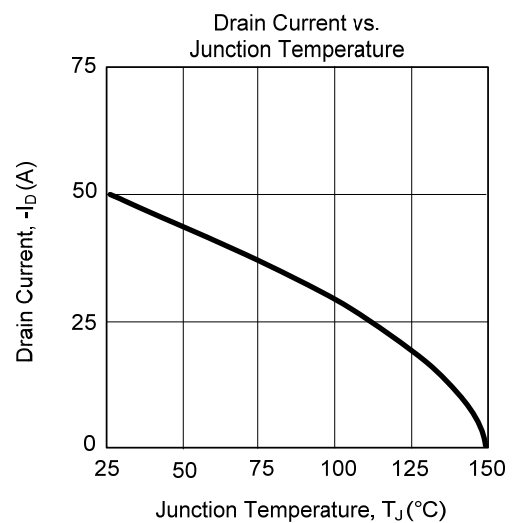
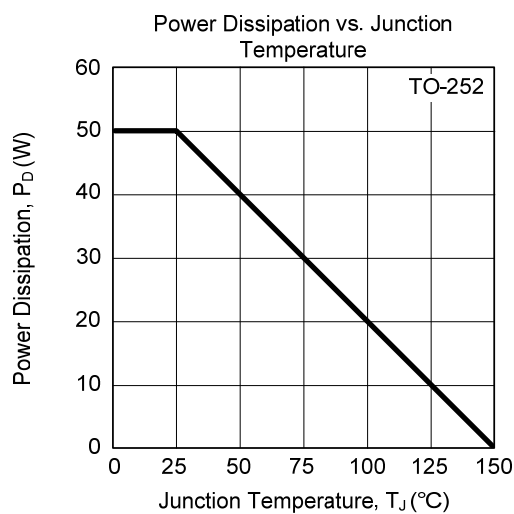
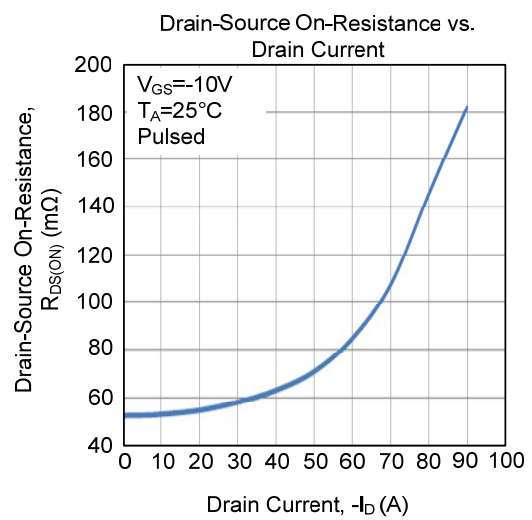
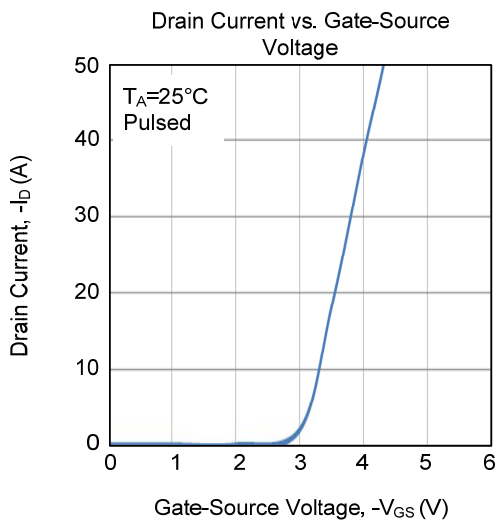
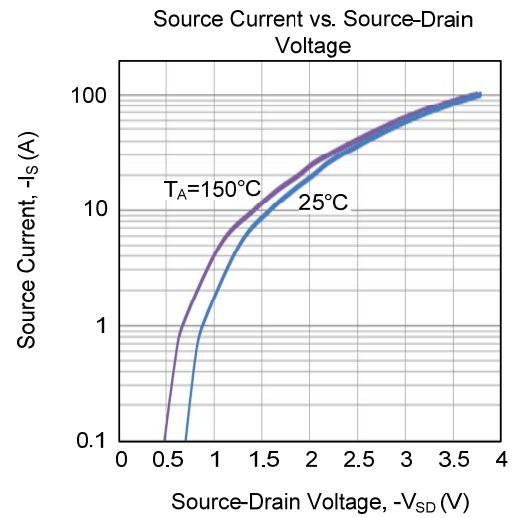
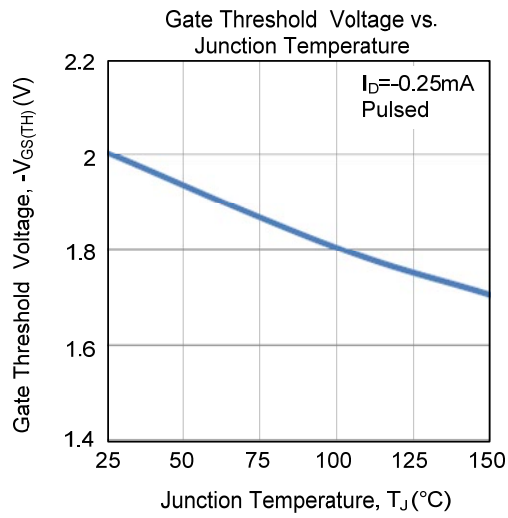


Unclamped Inductive Switching Waveforms

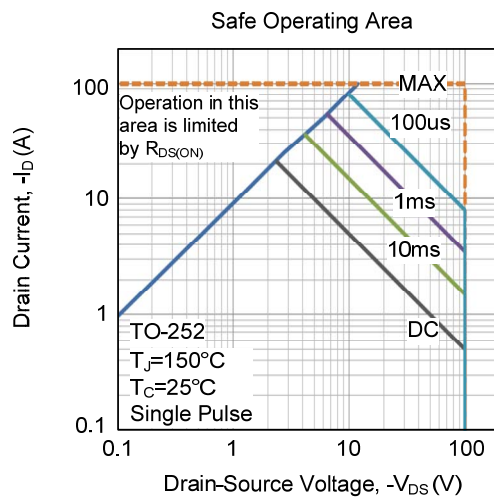
TYPICAL CHARACTERISTICS



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.