



4N70K-TC

Power MOSFET

4A, 700V N-CHANNEL POWER MOSFET

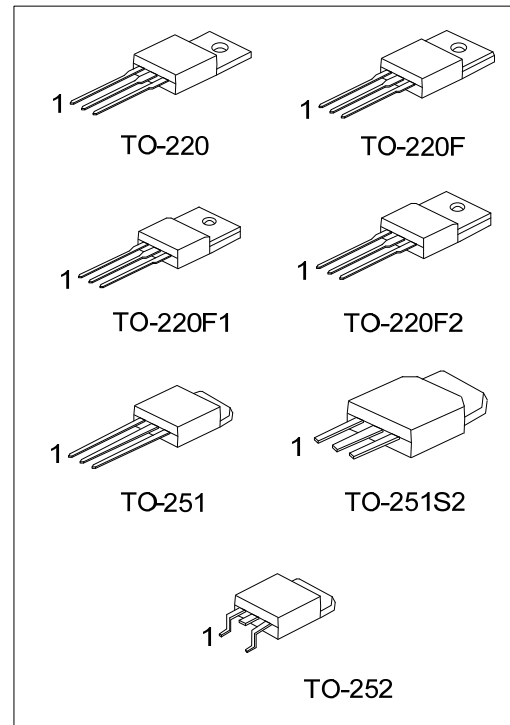
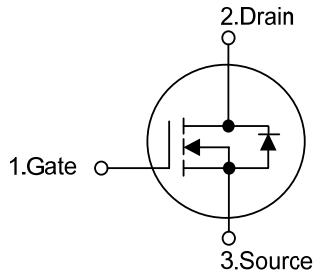
DESCRIPTION

The UTC **4N70K-TC** is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and high rugged avalanche. This high speed switching power MOSFET is usually used in power supplies, PWM motor controls, high efficient AC to DC converters and bridge circuits.

FEATURES

- * $R_{DS(ON)} \leq 3.3 \Omega$ @ $V_{GS}=10V, I_D=2.0A$
- * Fast Switching Capability
- * Avalanche Energy Specified
- * Improved dv/dt Capability, High Ruggedness

SYMBOL



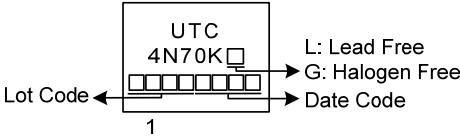
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
4N70KL-TA3-T	4N70KG-TA3-T	TO-220	G	D	S	Tube
4N70KL-TF1-T	4N70KG-TF1-T	TO-220F1	G	D	S	Tube
4N70KL-TF2-T	4N70KG-TF2-T	TO-220F2	G	D	S	Tube
4N70KL-TF3-T	4N70KG-TF3-T	TO-220F	G	D	S	Tube
4N70KL-TM3-T	4N70KG-TM3-T	TO-251	G	D	S	Tube
4N70KL-TMS2-T	4N70KG-TMS2-T	TO-251S2	G	D	S	Tube
4N70KL-TN3-R	4N70KG-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>4N70KG-TA3-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2 TF3: TO-220F, TM3: TO-251, TMS2: TO-251S2, TN3: TO-252 (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}	700	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	4	A
	Pulsed (Note 2)	I_{DM}	8	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	86	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.3	V/ns
Power Dissipation	TO-220	P_D	106	W
	TO-220F/TO-220F1		32	W
	TO-220F2			
	TO-251/TO-251S2 TO-252		49	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. $L = 30\text{mH}$, $I_{AS} = 2.4\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 4.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction-to-Ambient	TO-220/TO-220F TO-220F1/TO-220F2	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-251/TO-251S2 TO-252		110	$^\circ\text{C}/\text{W}$
	Junction-to-Case	TO-220	θ_{JC}	1.18
TO-220F/TO-220F1 TO-220F2		3.9		$^\circ\text{C}/\text{W}$
TO-251/TO-251S2 TO-252		2.55 (Note)		$^\circ\text{C}/\text{W}$

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

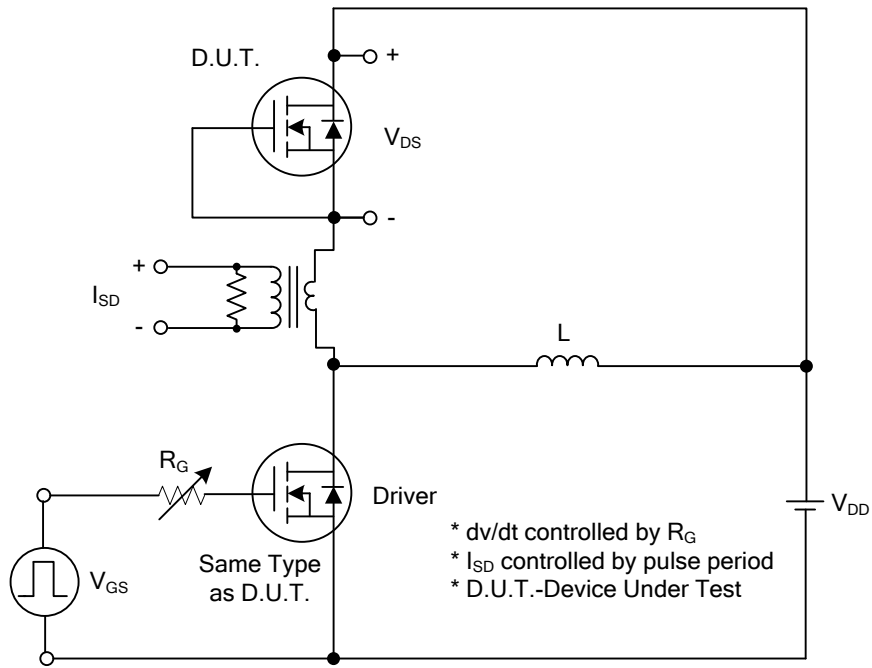
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	700			V	
Drain-Source Leakage Current	I _{DSS}	V _{DS} =700V, V _{GS} =0V			10	μA	
Gate-Source Leakage Current	Forward	I _{GSS} V _{GS} =30V, V _{DS} =0V			100	nA	
	Reverse		V _{GS} =-30V, V _{DS} =0V				-100
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 =2.0A			3.3	Ω	
DYNAMIC CHARACTERISTICS							
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1MHz		515		pF	
Output Capacitance	C _{OSS}				52		pF
Reverse Transfer Capacitance	C _{RSS}				4.8		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)	Q _G	V _{DS} =560V, V _{GS} =10V, I _D =4.0A I _G = 1mA (Note1, 2)		16.2		nC	
Gate to Source Charge	Q _{GS}				5		nC
Gate to Drain Charge	Q _{GD}				2.6		nC
Turn-on Delay Time (Note 1)	t _{D(ON)}	V _{DS} =100V, V _{GS} =10V, I _D =4.0A, R _G =25Ω (Note1, 2)		7		ns	
Rise Time	t _R				16		ns
Turn-off Delay Time	t _{D(OFF)}				39		ns
Fall-Time	t _F				29		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current	I _S				4	A	
Maximum Body-Diode Pulsed Current	I _{SM}				8	A	
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	V _{GS} =0V, I _S =4.0A			1.4	V	
Reverse Recovery Time (Note 1)	t _{rr}	V _{GS} =0V, I _S =4.0A, dI _F /dt=100A/μs		248		nS	
Reverse Recovery Charge	Q _{rr}				3.3		μC

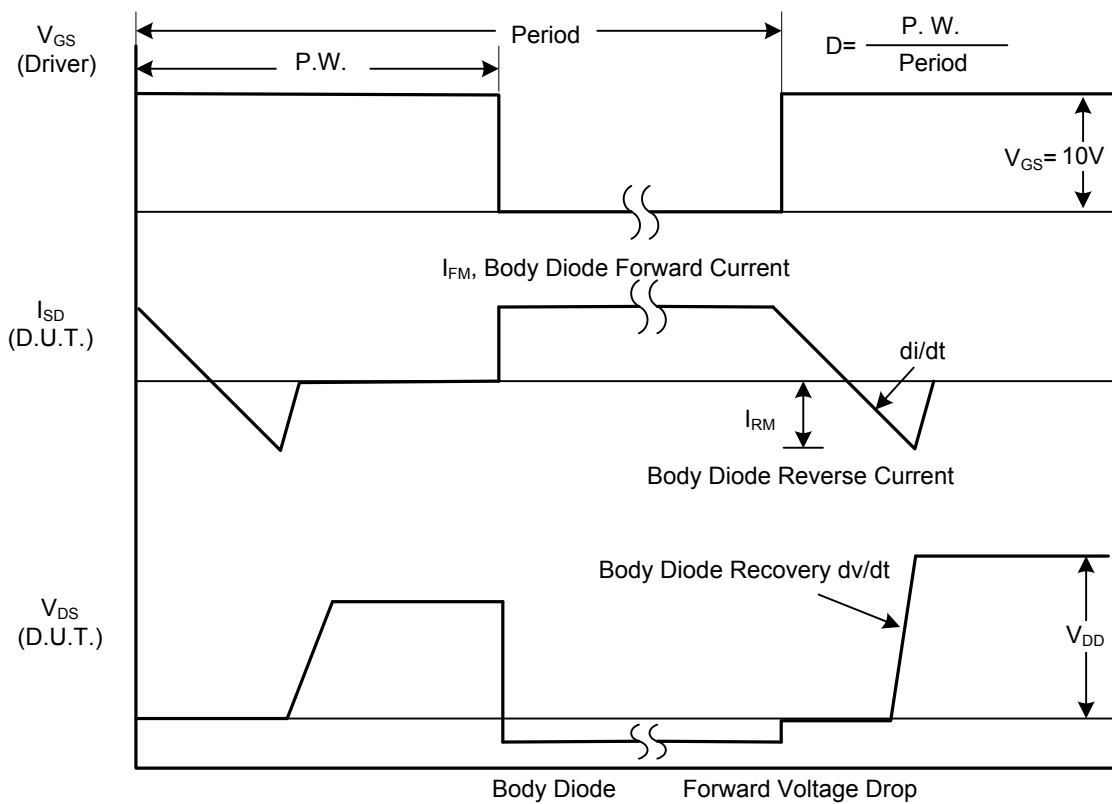
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

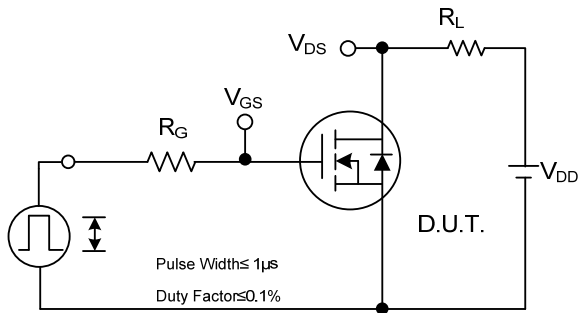


Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

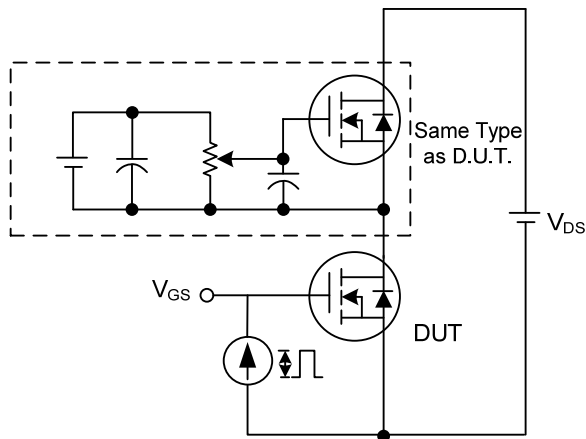
TEST CIRCUITS AND WAVEFORMS



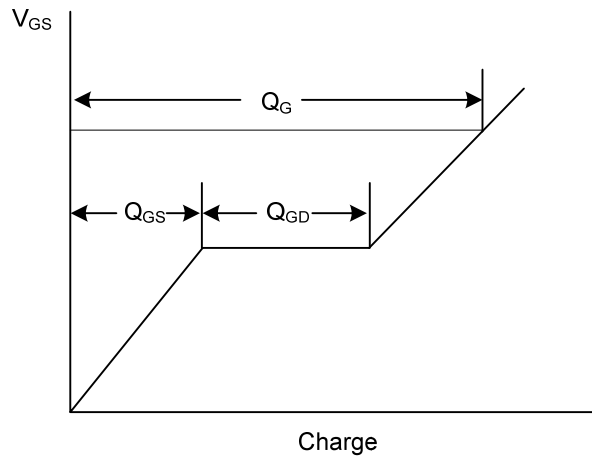
Switching Test Circuit



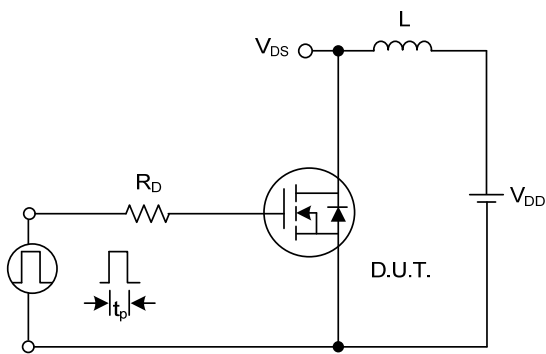
Switching Waveforms



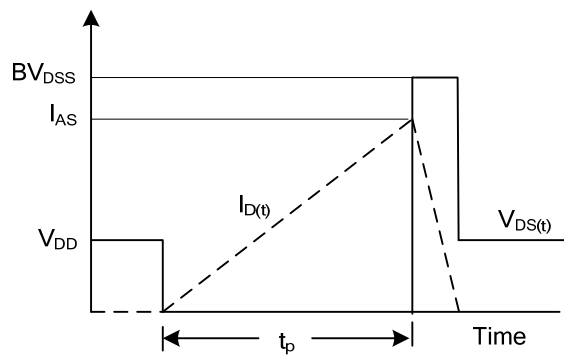
Gate Charge Test Circuit



Gate Charge Waveform

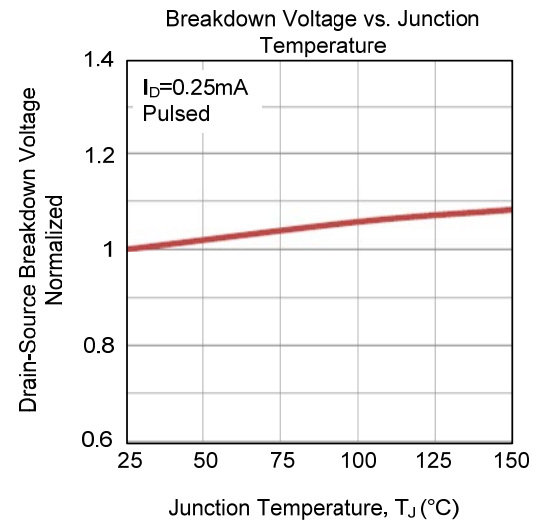
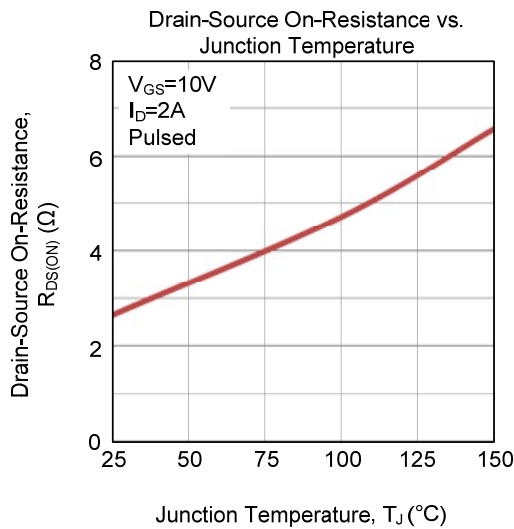
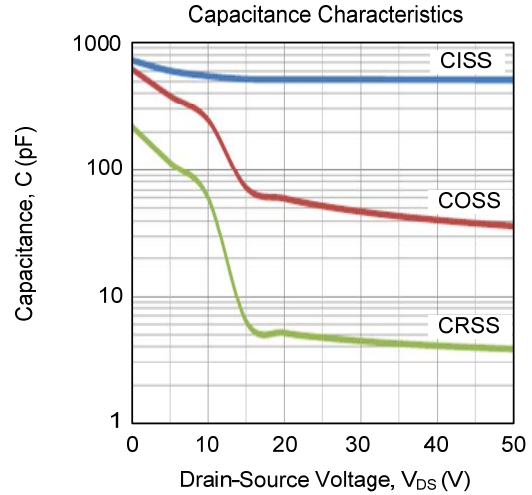
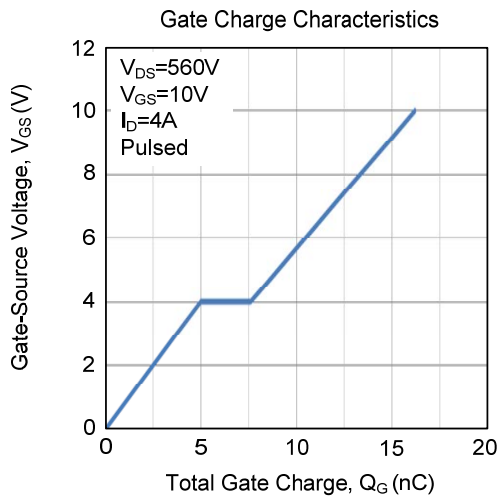
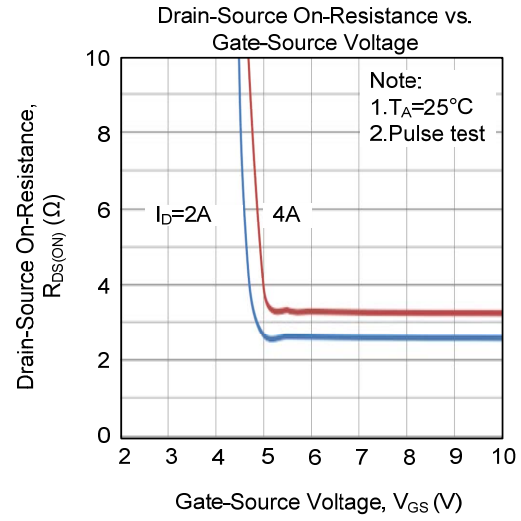
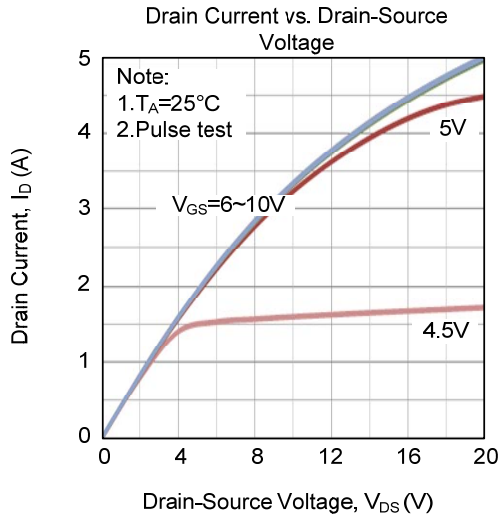


Unclamped Inductive Switching Test Circuit

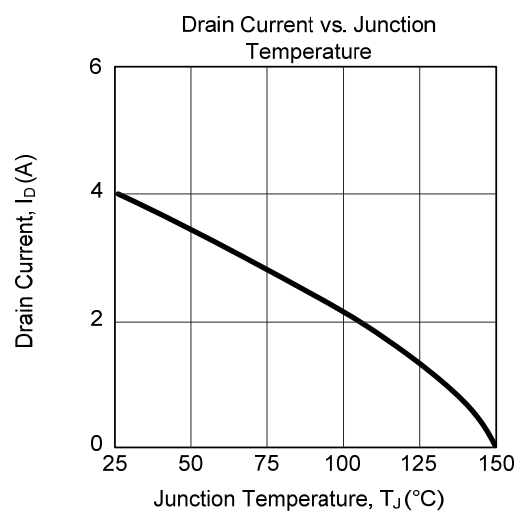
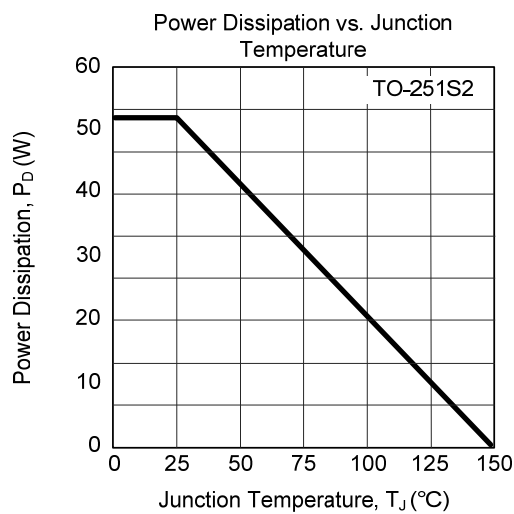
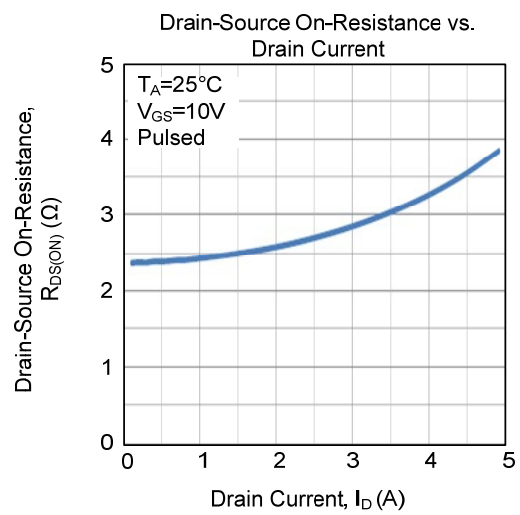
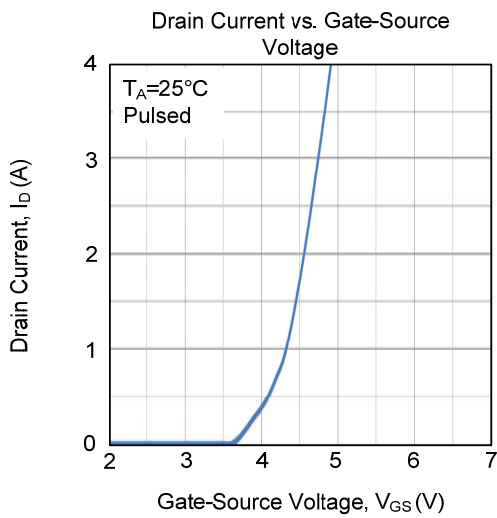
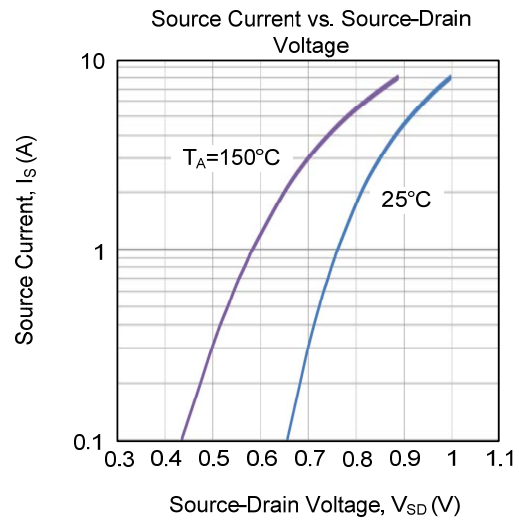
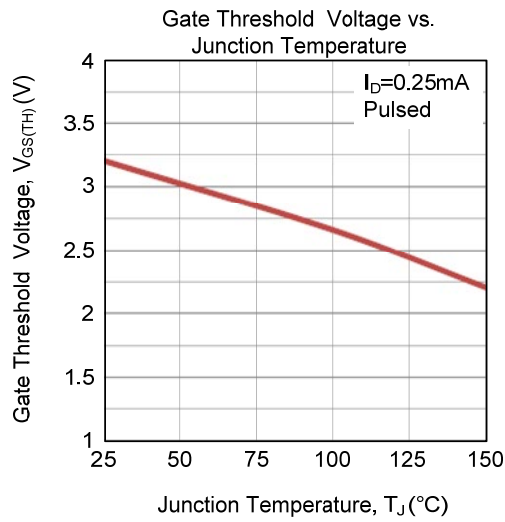


Unclamped Inductive Switching Waveforms

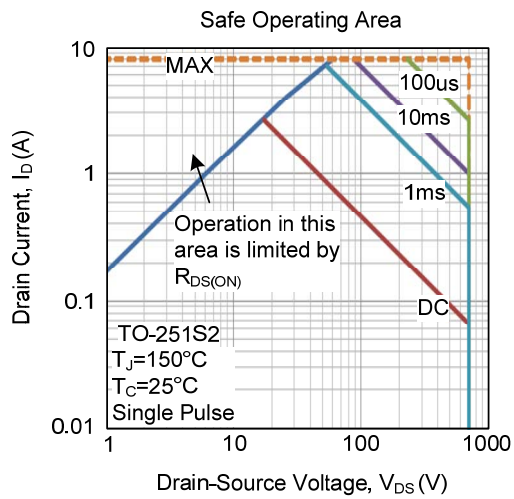
TYPICAL CHARACTERISTICS



■ 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.