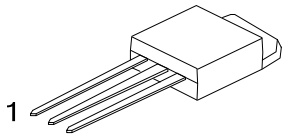
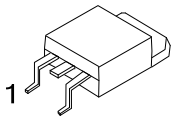
F7N50-ML

Power MOSFET

7.0A, 500V N-CHANNEL POWER MOSFET



TO-251



TO-252

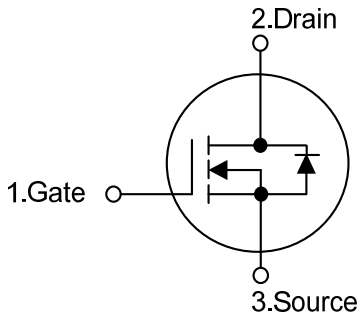
■ DESCRIPTION

The UTC **F7N50-ML** is a N-Channel enhancement mode silicon gate power MOSFET with Fast Body Diode. is designed high voltage, high speed power switching applications such. such as fast switching time, low gate charge, low on-state resistance and high rugged avalanche characteristics.

■ FEATURES

* $R_{DS(ON)} \leq 1.45\ \Omega$ @ V_{GS}=10V, I_D=3.5A
* Fast body diode MOSFET technology
* Low switching losses due to reduced Qrr
* Fast Switching Speeds
* 100% avalanche tested

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
F7N50L-TM3-T	F7N50G-TM3-T	TO-251	G	D	S	Tube
F7N50L-TN3-R	F7N50G-TN3-R	TO-252	G	D	S	Tape Reel

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

F7N50G-TM3-T

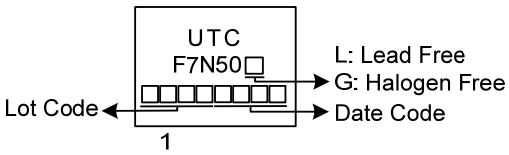
(1)Packing Type — (1) T: Tube, R: Tape Reel

(2)Package Type — (2) TM3: TO-251, TN3: TO-252

(3)Green Package — (3) G: Halogen Free and Lead Free, L: Lead Free

Copyright © 2023 Unisonic Technologies Co., Ltd

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	500	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current		I_D	7	A
Pulsed Drain Current (Note 2)		I_{DM}	28	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	163	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.6	V/ns
Power Dissipation		P_D	50	W
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°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 = 30mH, I_{AS} = 3.3A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
4. I_{SD} ≤ 7.0A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

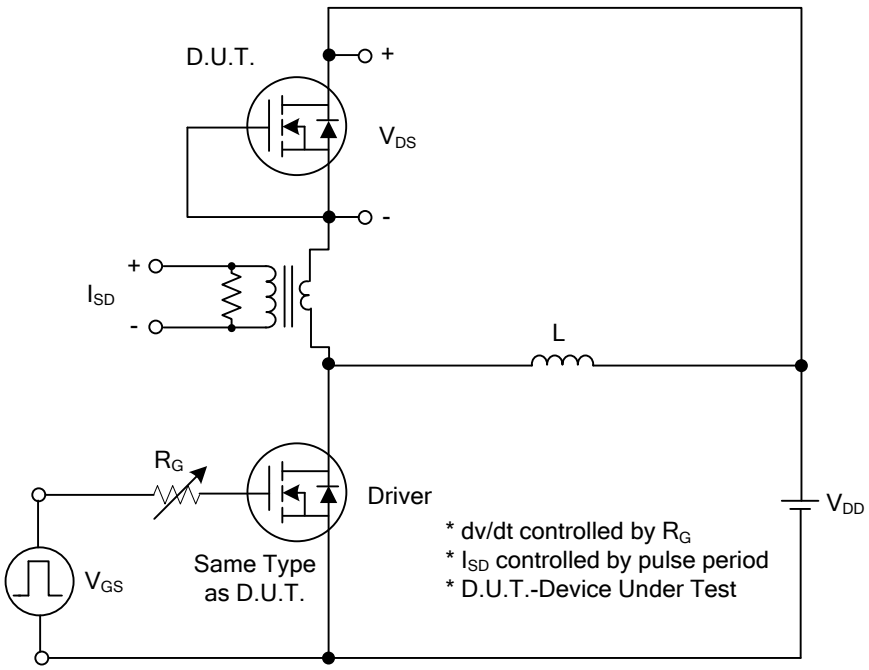
PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ_{JA}	62.5	°C/W
Junction to Case	θ_{JC}	2.5	°C/W

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

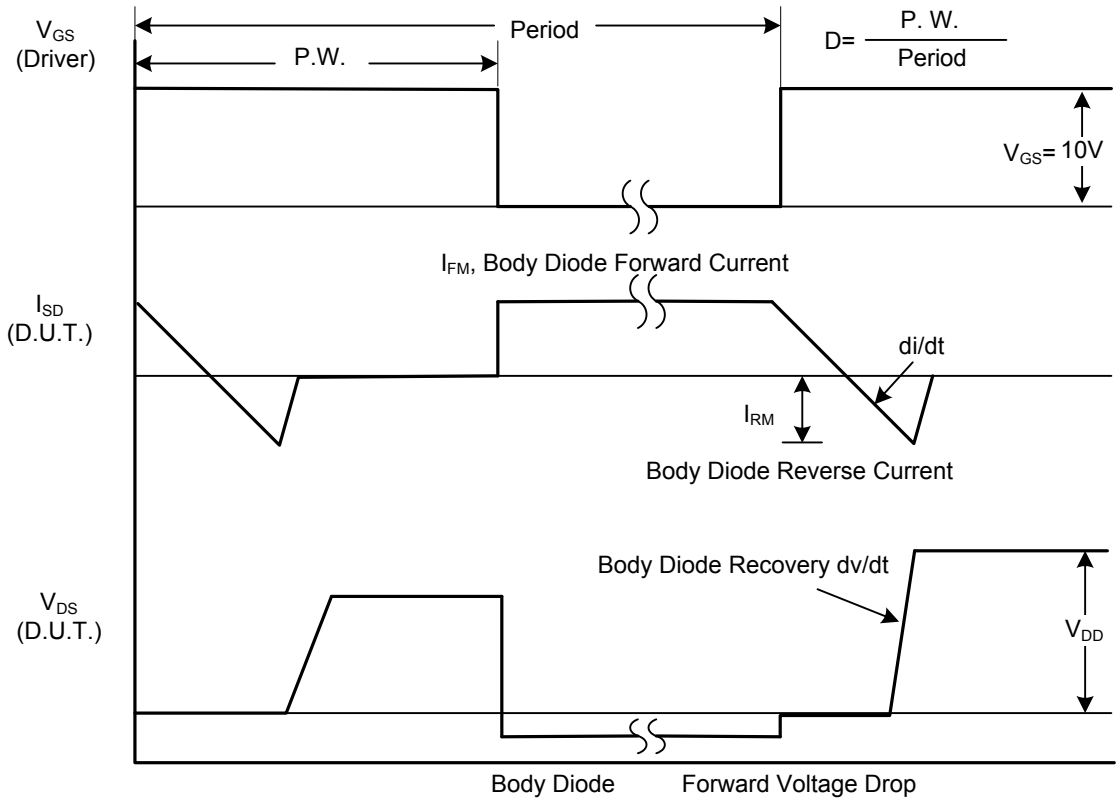
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	500			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=500V, V_{GS}=0V			10	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=30V, V_{DS}=0V			100	nA
	Reverse		V_{GS}=-30V, V_{DS}=0V			-100	nA
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=3.5A			1.45	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz		778		pF
Output Capacitance		C_{OSS}			78		pF
Reverse Transfer Capacitance		C_{RSS}			5.8		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=400V, V_{GS}=10V, I_D=7.0A (Note 1, 2)		29		nC
Gate-Source Charge		Q_{GS}			11		nC
Gate-Drain Charge		Q_{GD}			5		nC
Turn-On Delay Time (Note 1)		$t_{D(ON)}$	V_{DS}=100V, V_{GS}=10V, I_D=7.0A R_G=25Ω (Note 1, 2)		10		ns
Turn-On Rise Time		t_R			18		ns
Turn-Off Delay Time		$t_{D(OFF)}$			50		ns
Turn-Off Fall Time		t_F			29		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Body-Diode Continuous Current		I_S				7	A
Maximum Body-Diode Pulsed Current		I_{SM}				28	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=7.0A , V_{GS}=0V			1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	I_S=7.0A , V_{GS}=0V di/dt=100A/μs		90		ns
Reverse Recovery Charge		Q_{rr}			195		nC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

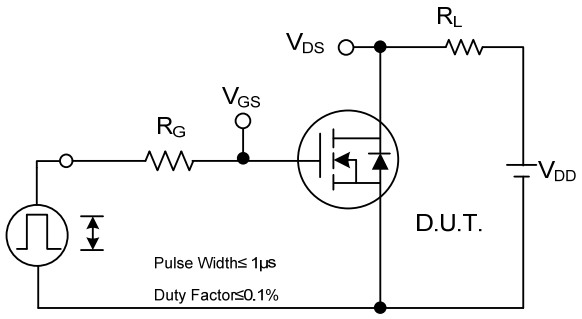


Peak Diode Recovery dv/dt Test Circuit

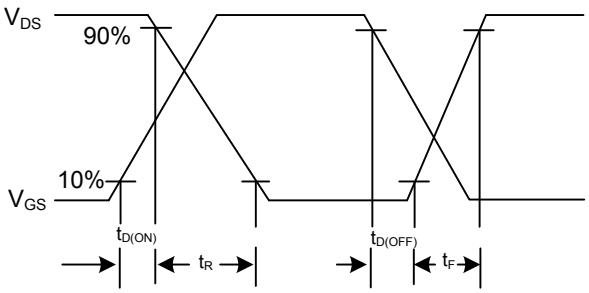


Peak Diode Recovery dv/dt Waveforms

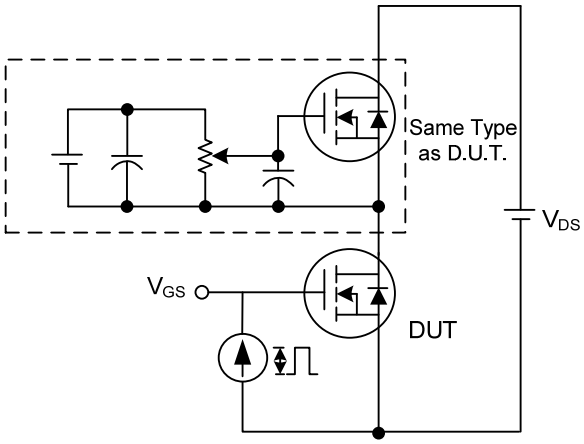
■ TEST CIRCUITS AND WAVEFORMS



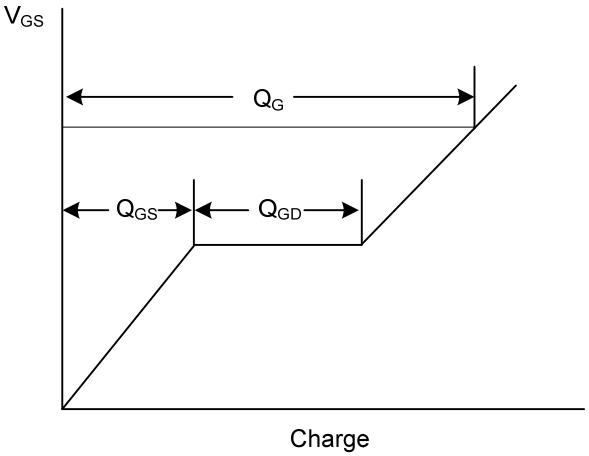
Switching Test Circuit



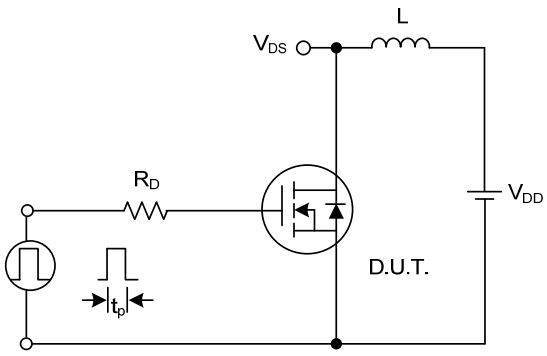
Switching Waveforms



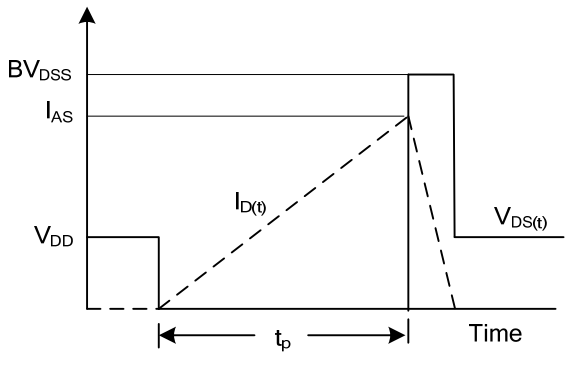
Gate Charge Test Circuit



Gate Charge Waveform



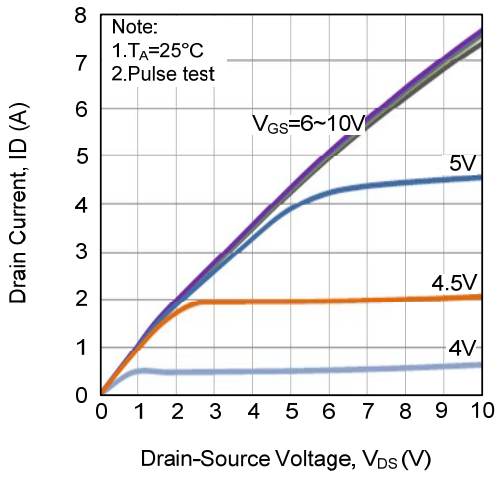
Unclamped Inductive Switching Test Circuit



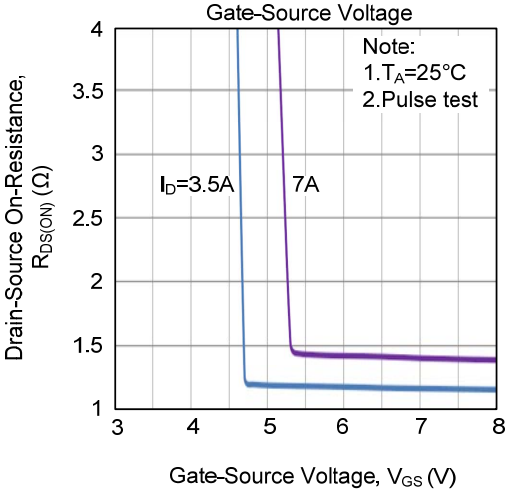
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

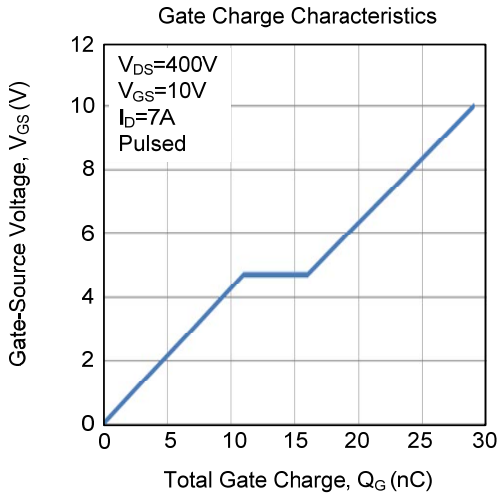
Drain Current vs. Drain-Source Voltage



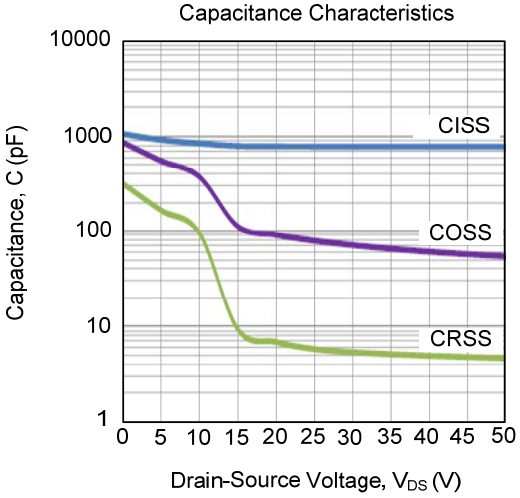
Drain-Source On-Resistance vs. Gate-Source Voltage



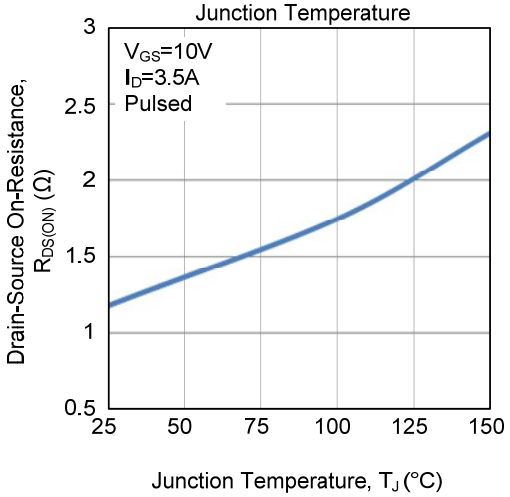
Gate Charge Characteristics



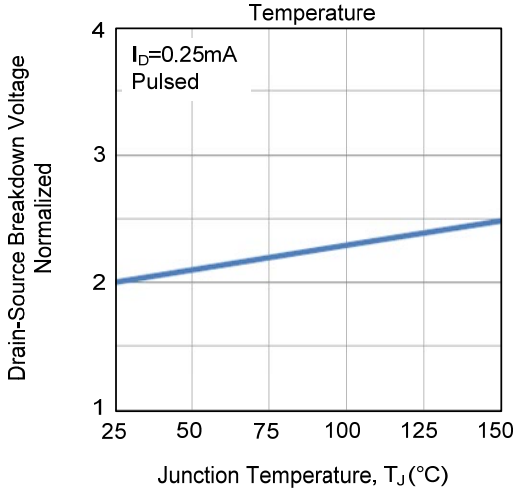
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

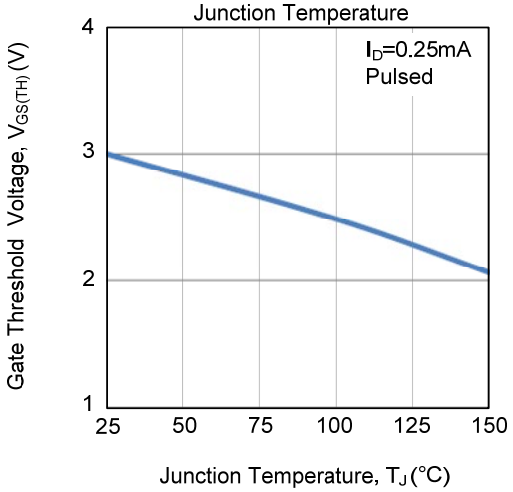


Breakdown Voltage vs. Junction Temperature

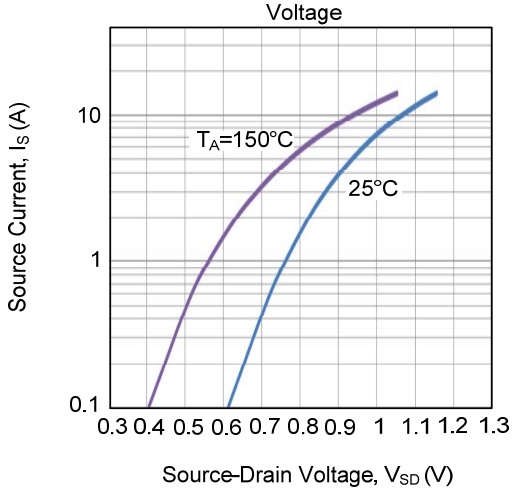


■ TYPICAL CHARACTERISTICS (Cont.)

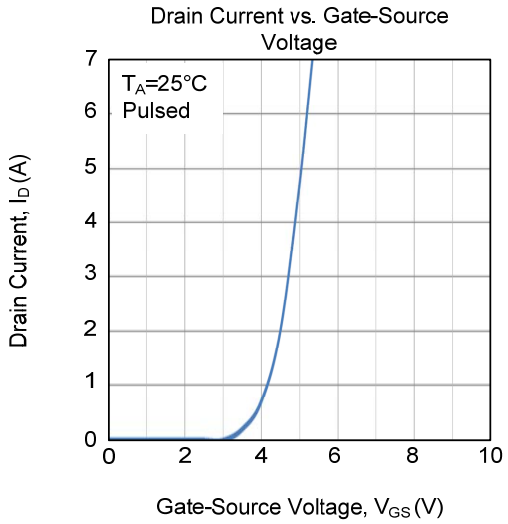
Gate Threshold Voltage vs. Junction Temperature



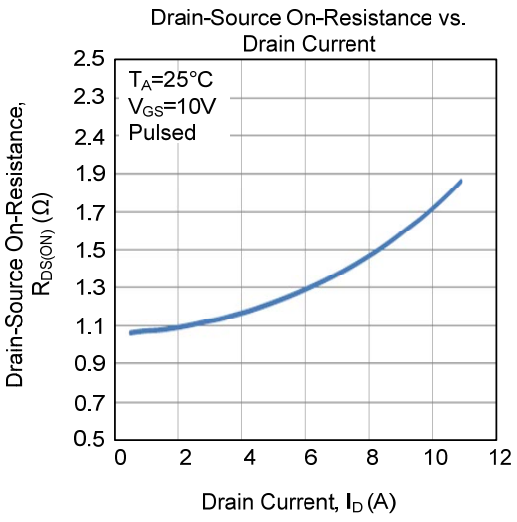
Source Current vs. Source-Drain Voltage



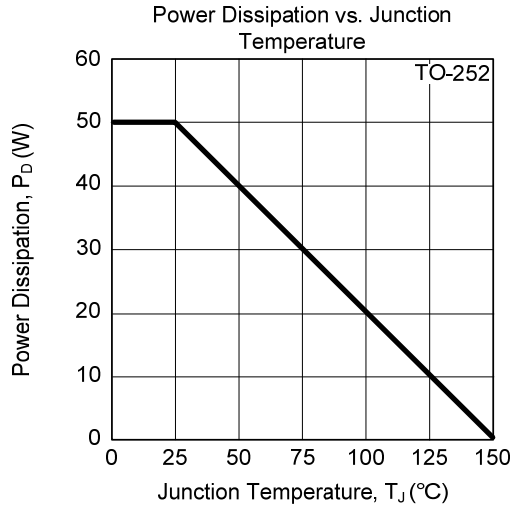
Drain Current vs. Gate-Source Voltage



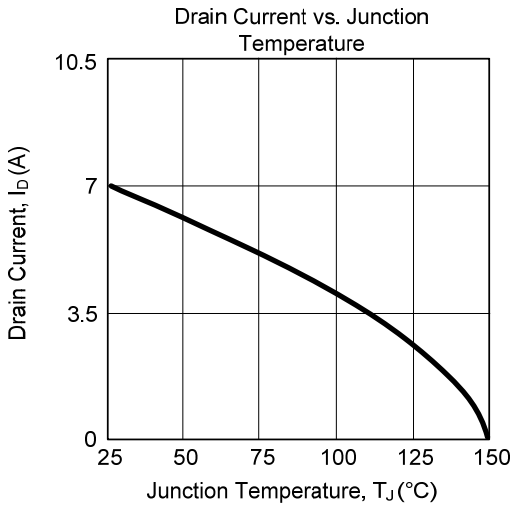
Drain-Source On-Resistance vs. Drain Current



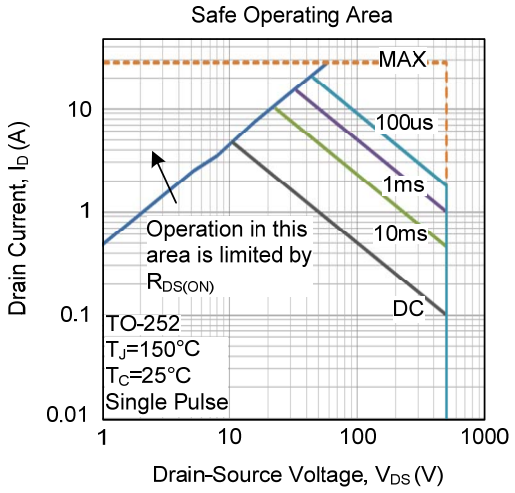
Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ 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.