



F7N60-ML

Power MOSFET

7.0A, 600V N-CHANNEL POWER MOSFET

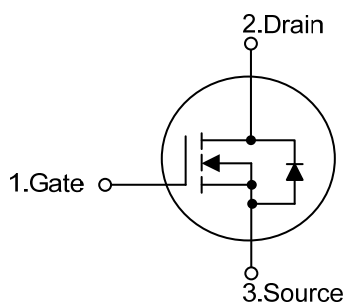
DESCRIPTION

The UTC **F7N60-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

- * $R_{DS(ON)} \leq 1.5 \Omega$ @ $V_{GS}=10V$, $I_D=3.5A$
- * Fast body diode MOSFET technology
- * Low switching losses due to reduced Q_{rr}
- * Single Pulse Avalanche Energy Rated
- * Fast Switching Speeds
- * Linear Transfer Characteristics
- * High Input Impedance
- * Avalanche energy tested

SYMBOL

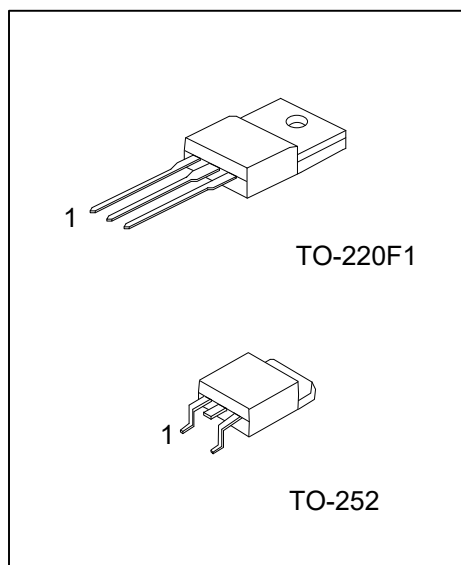


ORDERING INFORMATION

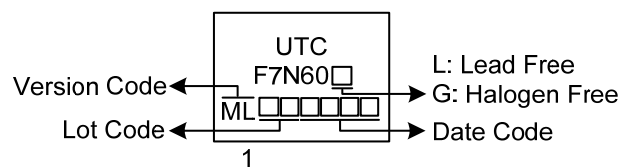
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
F7N60L-ML-TF1-T	F7N60G-ML-TF1-T	TO-220F1	G	D	S	Tube
F7N60L-ML-TN3-R	F7N60G-ML-TN3-R	TO-252	G	D	S	Tape Reel

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

F7N60G-ML-TF1-T (1) Packing Type (2) Package Type (3) Version Code (4) Green Package	(1) T: Tube, R: Tape Reel (2) TF1: TO-220F1, TN3: TO-252 (3) Version ML (4) G: Halogen Free and Lead Free, L: Lead Free
--	--



■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DS}	600	V
Gate-Source Voltage		V_{GS}	± 30	V
Continuous Drain Current		I_D	7	A
Pulsed Drain Current (Note 2)		I_{DM}	14	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	32	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	8.8	V/ns
Power Dissipation	TO-220F1	P_D	35	W
	TO-252		48	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. $L = 1.0\text{ mH}$, $I_{AS} = 8.0\text{ A}$, $V_{DD} = 50\text{ V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD} \leq 7.0\text{ A}$, $di/dt \leq 200\text{ A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F1	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	TO-252		110	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220F1	θ_{JC}	3.57	$^{\circ}\text{C}/\text{W}$
	TO-252		2.6 (Note)	$^{\circ}\text{C}/\text{W}$

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

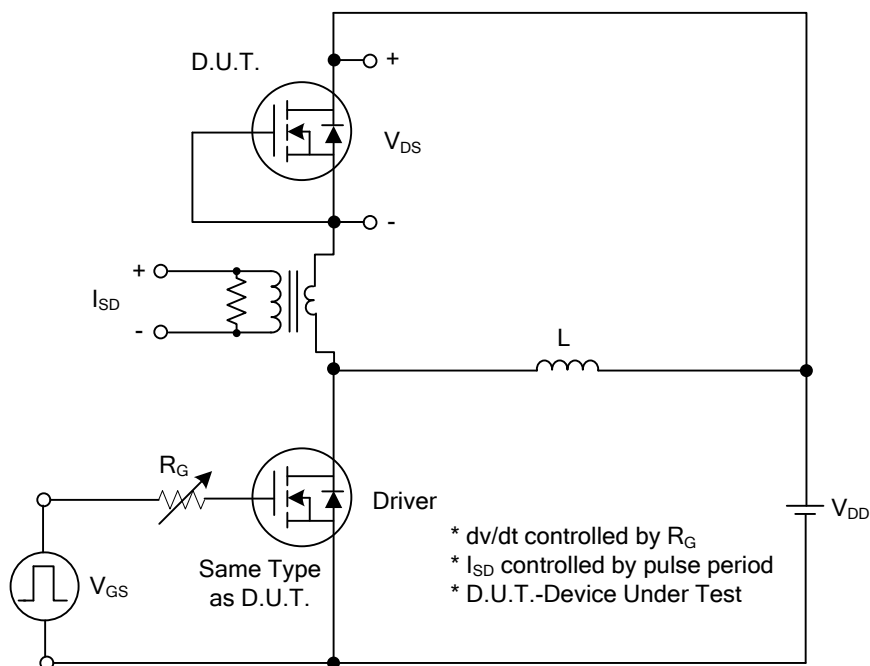
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	600			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =600V, 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		1.2	1.5	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		1051		pF
Output Capacitance		C _{OSS}			99		pF
Reverse Transfer Capacitance		C _{RSS}			9		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =520V, V _{GS} =10V, I _D =7.0A (Note 1, 2)		30		nC
Gate-Source Charge		Q _{GS}			7		nC
Gate-Drain Charge		Q _{GD}			9		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)		15		Ns
Turn-On Rise Time		t _R			21		Ns
Turn-Off Delay Time		t _{D(OFF)}			76		Ns
Turn-Off Fall Time		t _F			31		Ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Body-Diode Continuous Current		I _S				7	A
Maximum Body-Diode Pulsed Current		I _{SM}				14	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		104		ns
Reverse Recovery Charge		Q _{rr}	di/dt=100A/μs		252		μC

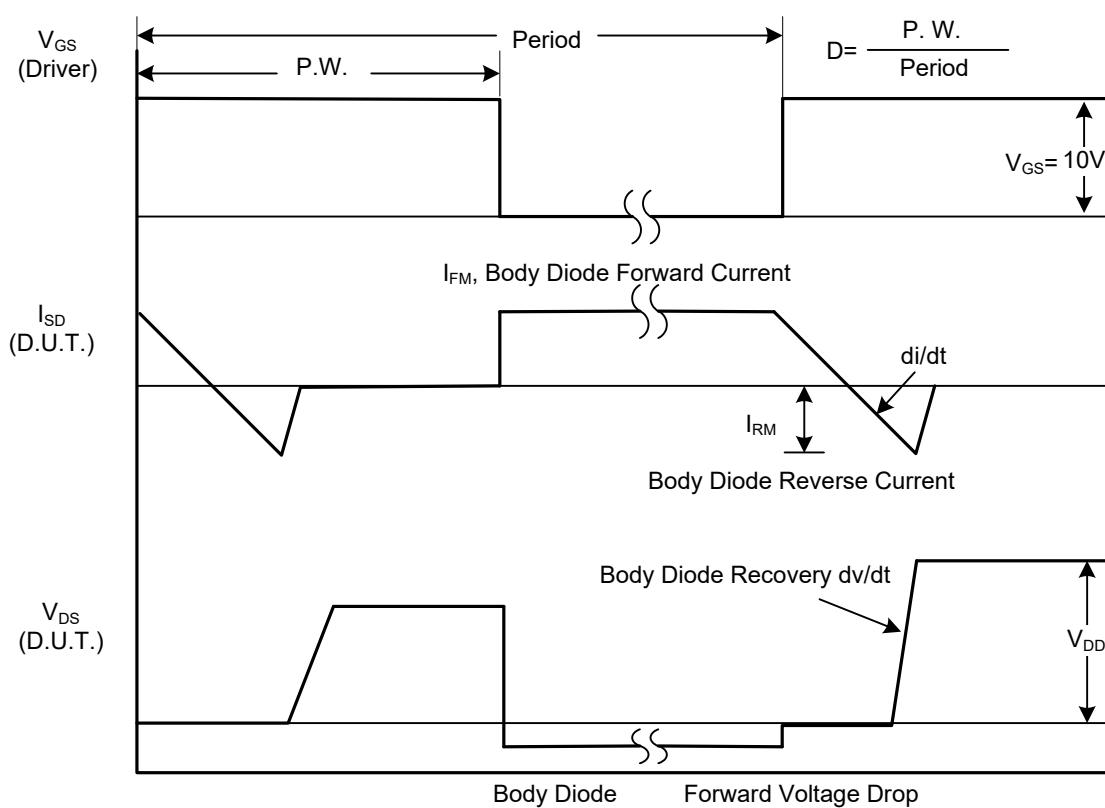
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

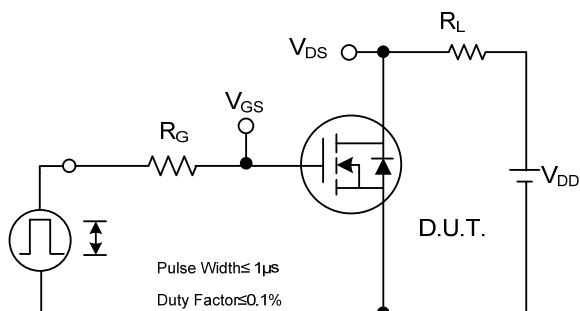


Peak Diode Recovery dv/dt Test Circuit

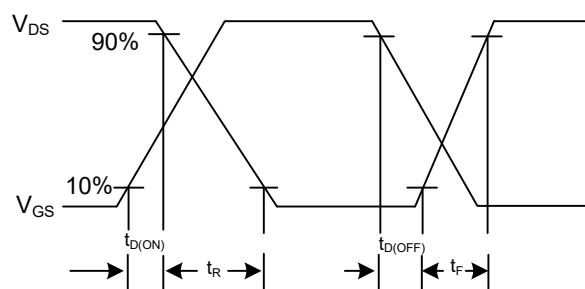


Peak Diode Recovery dv/dt Waveforms

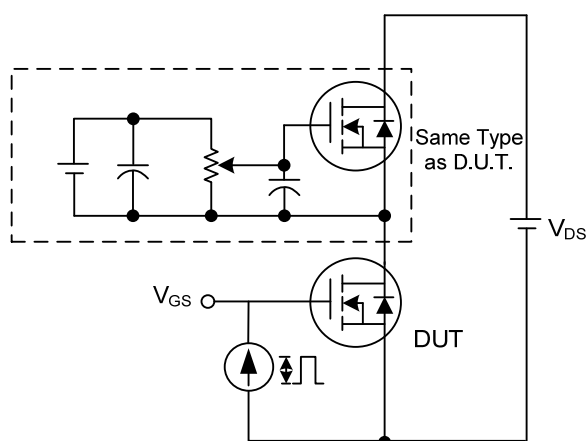
■ TEST CIRCUITS AND WAVEFORMS



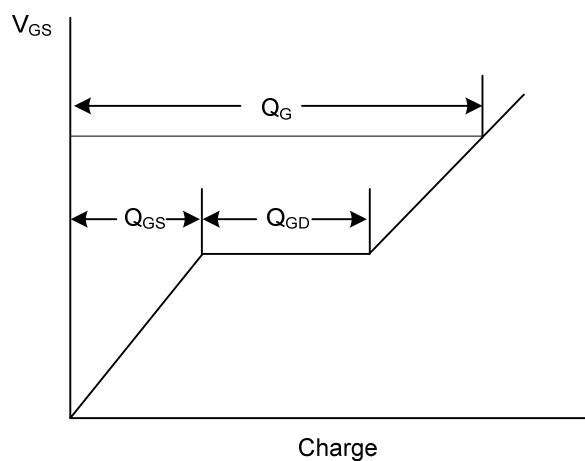
Switching Test Circuit



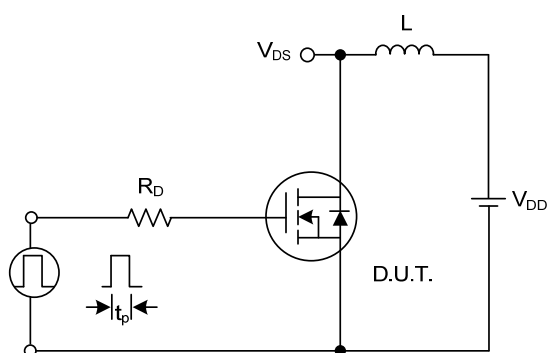
Switching Waveforms



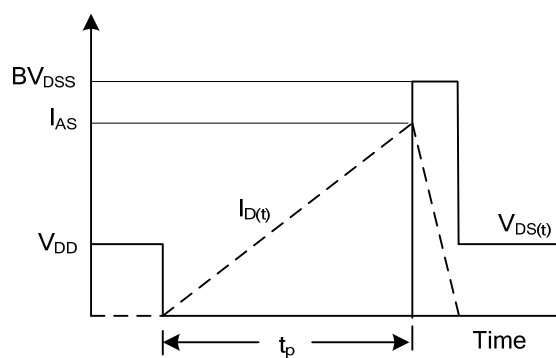
Gate Charge Test Circuit



Gate Charge Waveform

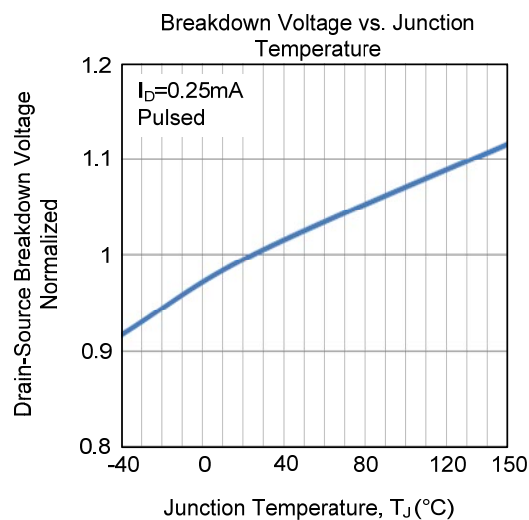
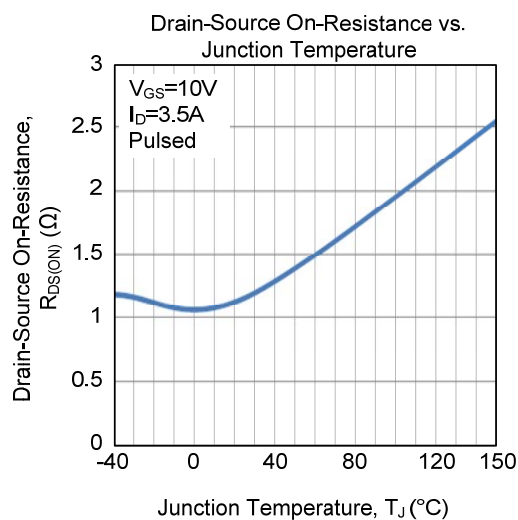
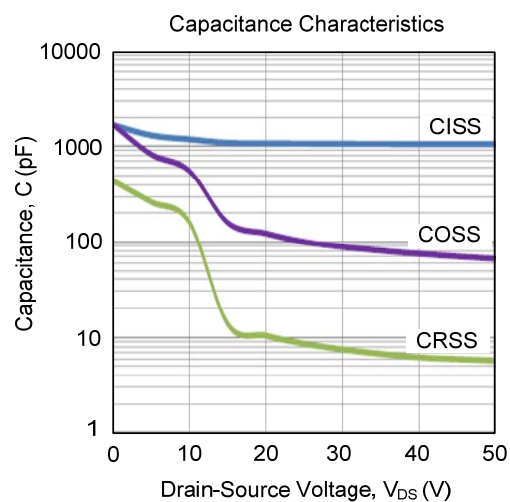
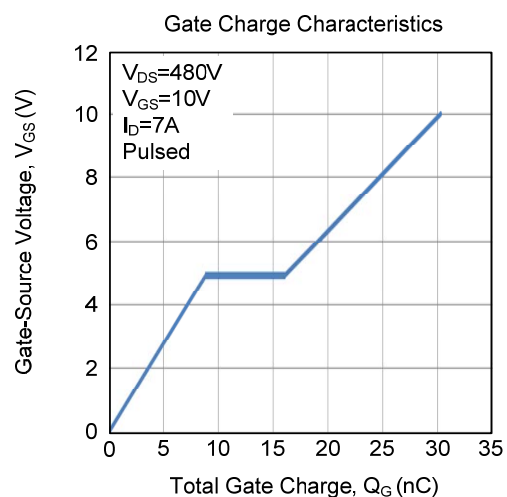
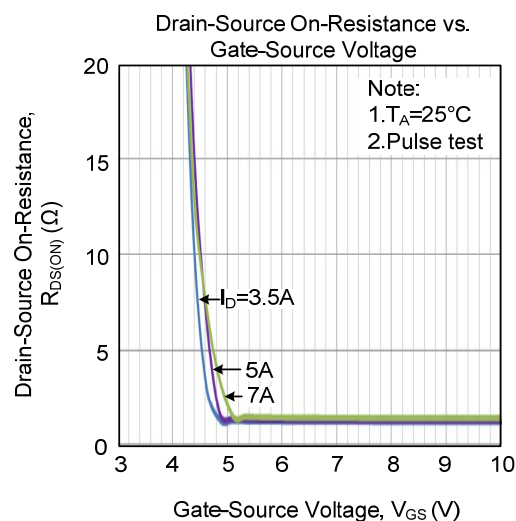
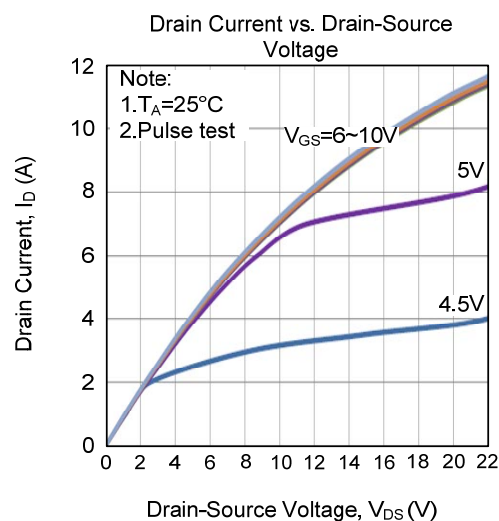


Unclamped Inductive Switching Test Circuit

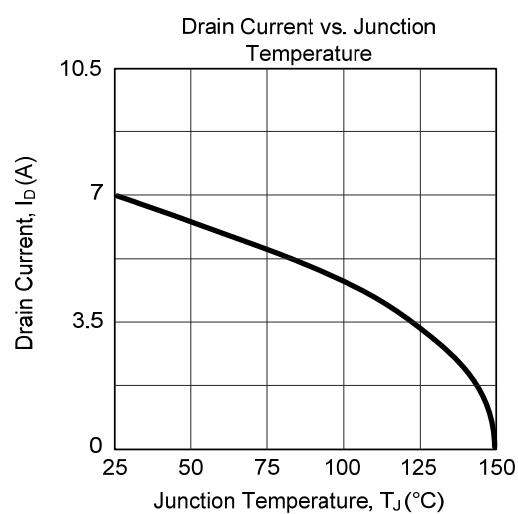
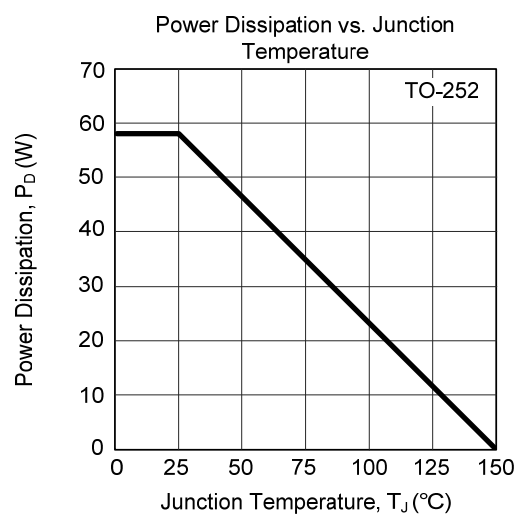
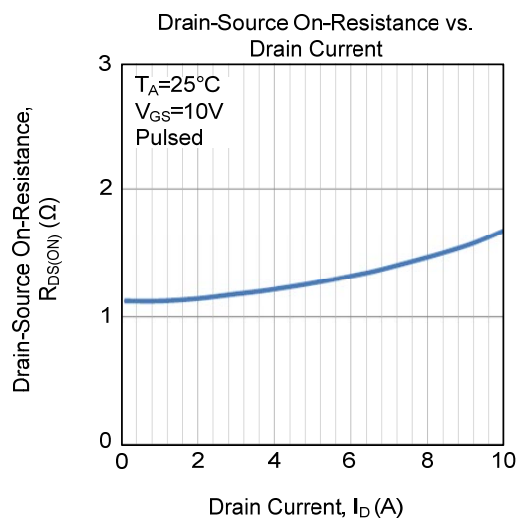
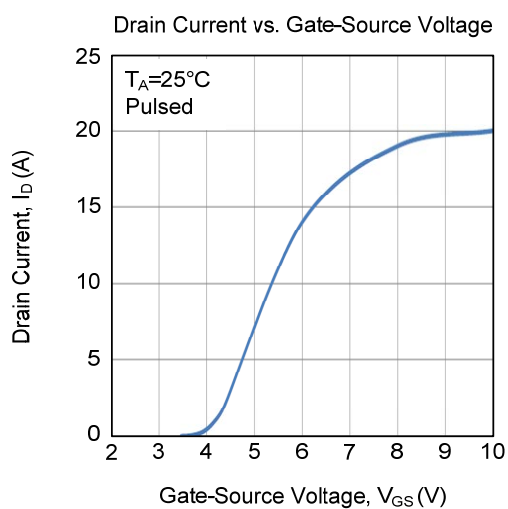
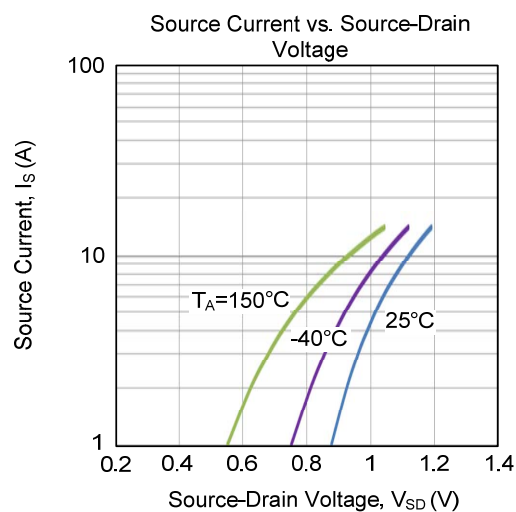
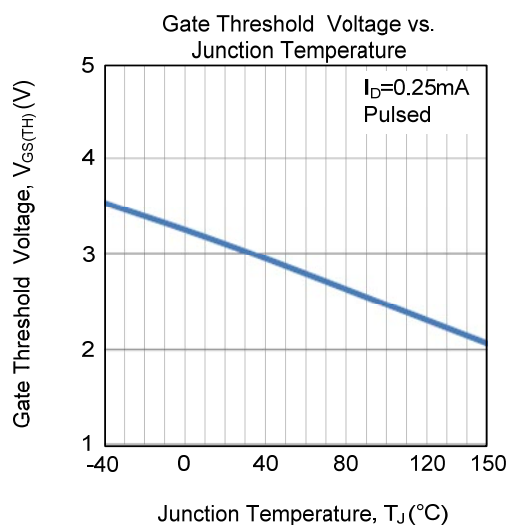


Unclamped Inductive Switching Waveforms

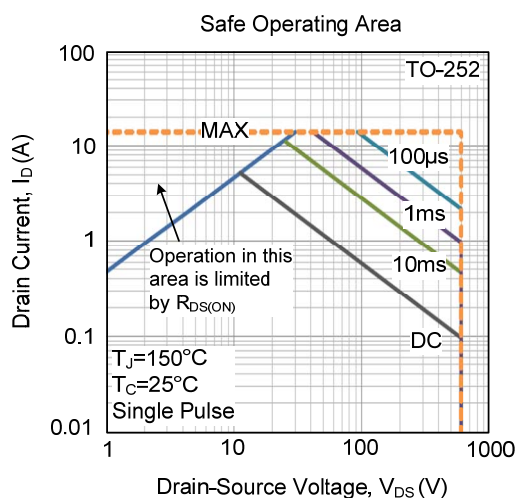
TYPICAL CHARACTERISTICS



■ 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.