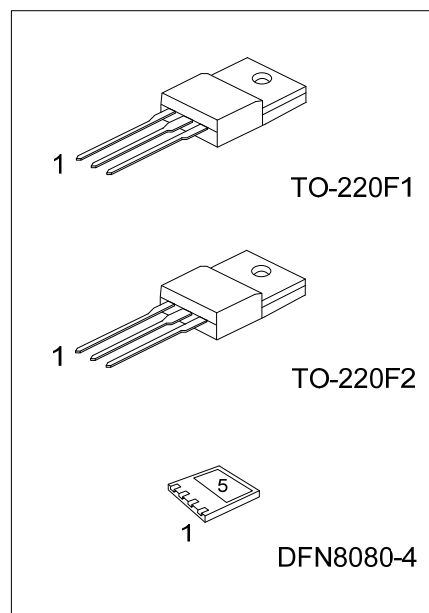
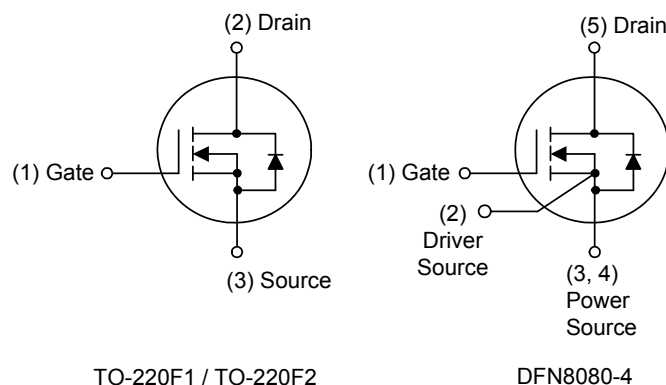


**24NM70****Power MOSFET****24A, 700V N-CHANNEL
SUPER-JUNCTION MOSFET****DESCRIPTION**

The **UTC 24NM70** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

FEATURES

- * $R_{DS(ON)} \leq 0.19 \Omega$ @ $V_{GS}=10V$, $I_D=12A$
- * High Switching Speed
- * 100% Avalanche Tested

SYMBOL**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment					Packing
Lead Free	Halogen Free		1	2	3	4	5	
24NM70L-TF1-T	24NM70G-TF1-T	TO-220F1	G	D	S	-	-	Tube
24NM70L-TF2-T	24NM70G-TF2-T	TO-220F2	G	D	S	-	-	Tube
24NM70L-K04-8080-R	24NM70G-K04-8080-R	DFN8080-4	G	S	S	S	S	Tape Reel

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

24NM70G-TF1-T (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) TF1: TO-220F1, TF2: TO-220F2, K04-8080: DFN8080-4 (3) G: Halogen Free and Lead Free, L: Lead Free
---	--

MARKING

TO-220F1 / TO-220F2	DFN8080-4
UTC 24NM70 Lot Code ← [][][][][] → Date Code L: Lead Free G: Halogen Free 1	UTC 24NM70 Lot Code ← [] • [][][][] → Date Code

■ **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	24	A
	Pulsed (Note 2)	I_{DM}	96	A
Avalanche Current (Note 2)		I_{AR}	5.2	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	879	mJ
Peak Diode Recovery dv/dt		dv/dt	6.3	V/ns
Power Dissipation	TO-220F1/TO-220F2	P_D	36	W
	DFN8080-4		68	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. $L = 65\text{mH}$, $I_{AS} = 5.2\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD} \leq 24\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F1/TO-220F2	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	DFN8080-4		35 (Note)	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220F1/TO-220F2	θ_{JC}	3.47	$^{\circ}\text{C}/\text{W}$
	DFN8080-4		1.83 (Note)	$^{\circ}\text{C}/\text{W}$

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

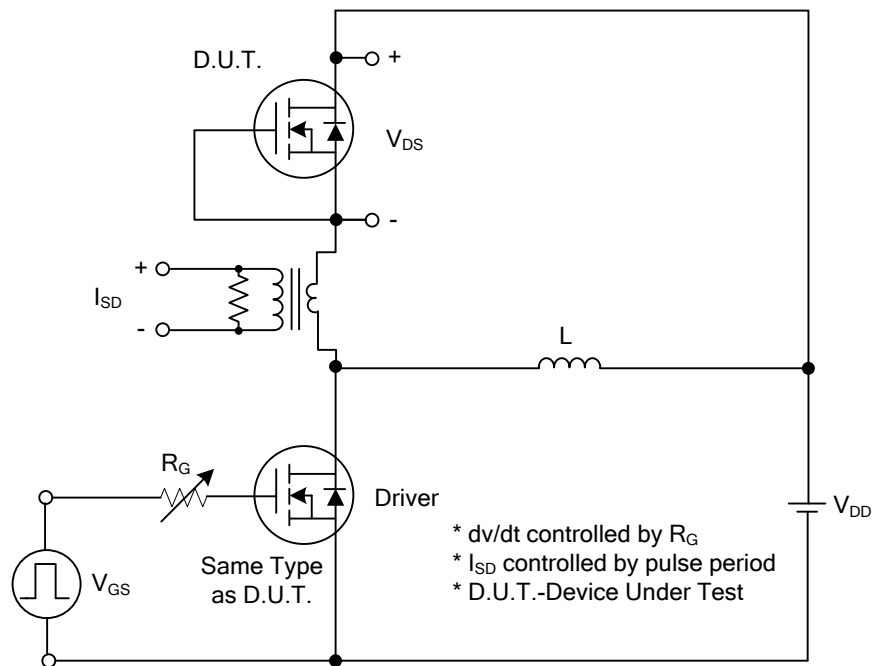
■ ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	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	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.5		4.5	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =12A		0.18	0.19	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		2000		pF
Output Capacitance		C _{OSS}			1280		pF
Reverse Transfer Capacitance		C _{RSS}			110		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =560V, V _{GS} =10V, I _D =24A I _G = 1mA (Note1, 2)		70		nC
Gate to Source Charge		Q _{GS}			9.6		nC
Gate to Drain Charge		Q _{GD}			27.2		nC
Turn-ON Delay Time (Note 1)		t _{D(ON)}	V _{DS} =100V, V _{GS} =10V, I _D =24A, R _G =25Ω (Note1, 2)		26		ns
Rise Time		t _R			32		ns
Turn-OFF Delay Time		t _{D(OFF)}			240		ns
Fall-Time		t _F			110		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				24	A
Maximum Body-Diode Pulsed Current		I _{SM}				96	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =24A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)		t _{rr}	I _S =24A, V _{GS} =0V,		520		ns
Body Diode Reverse Recovery Charge		Q _{rr}	dl _F /dt=100A/μs		10.5		μC

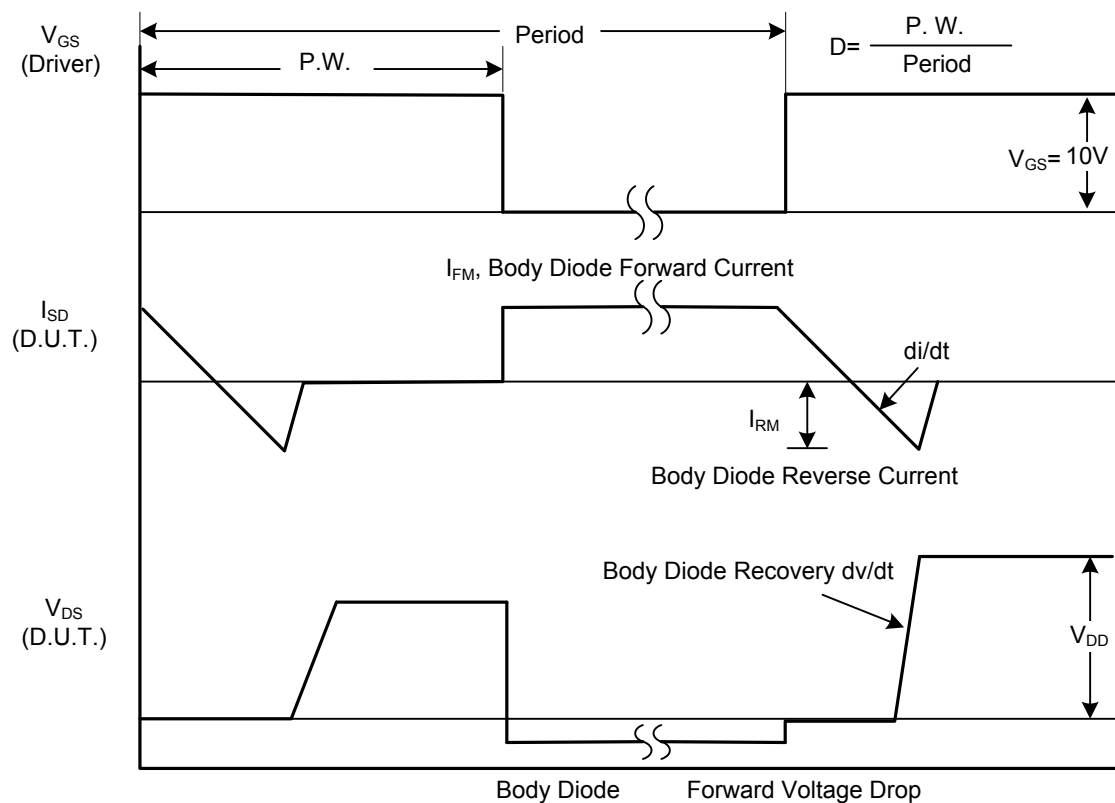
Notes: 1. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS



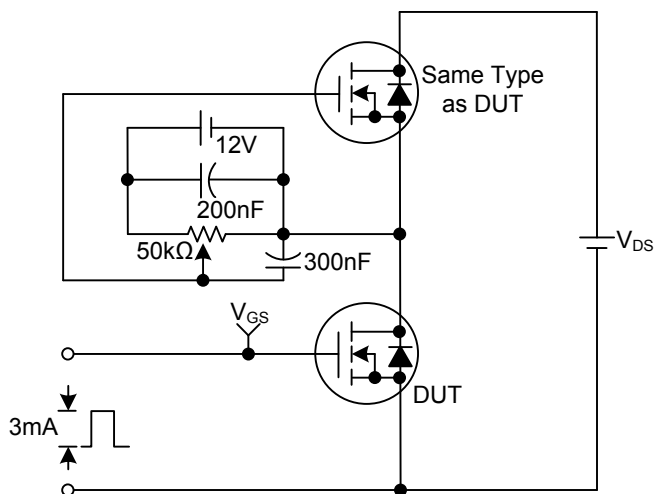
Peak Diode Recovery dv/dt Test Circuit



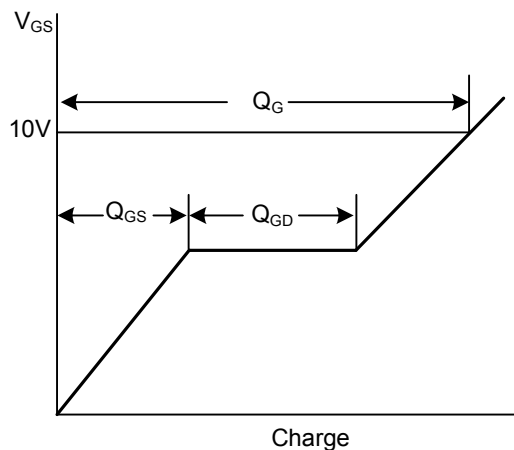
Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS

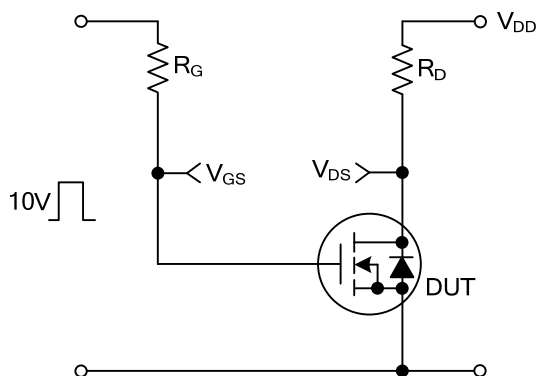
Gate Charge Test Circuit



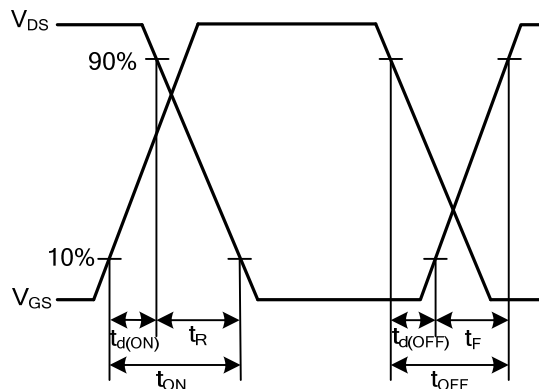
Gate Charge Waveforms



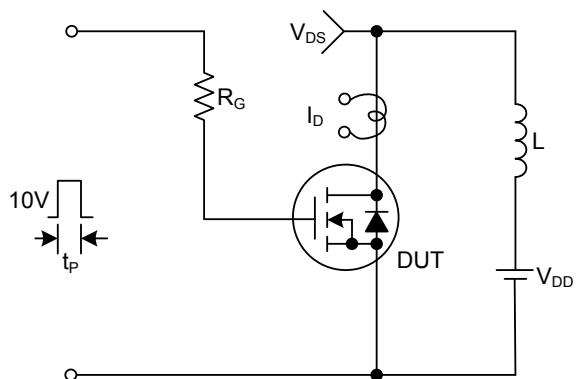
Resistive Switching Test Circuit



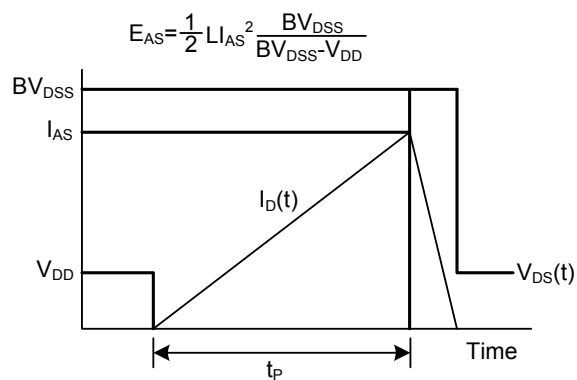
Resistive Switching Waveforms



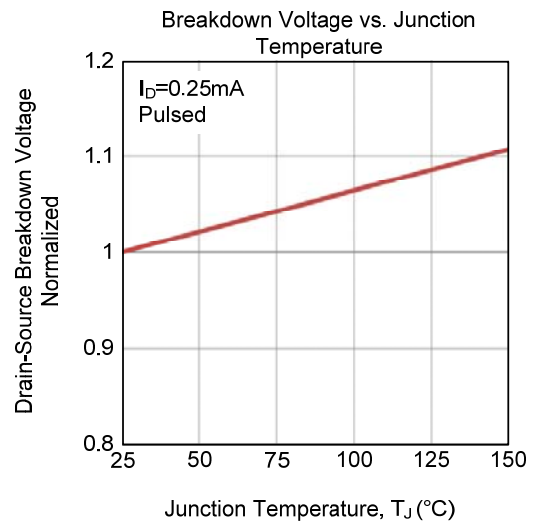
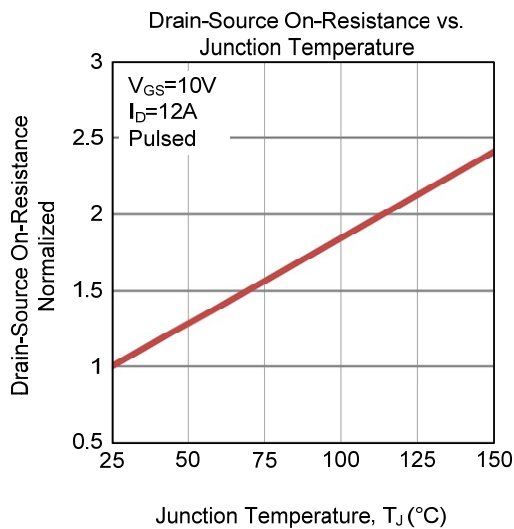
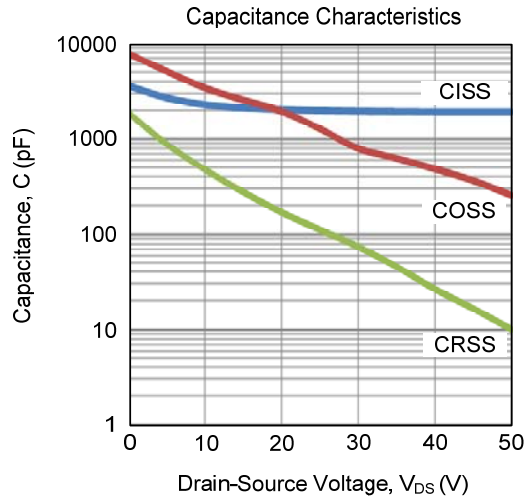
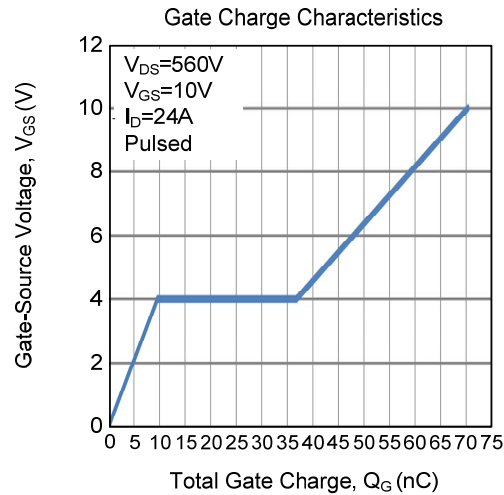
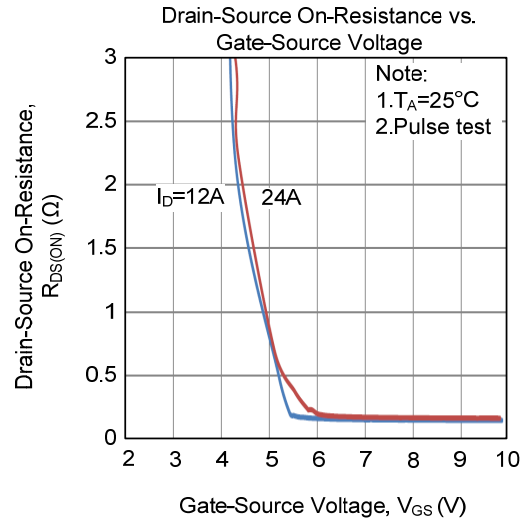
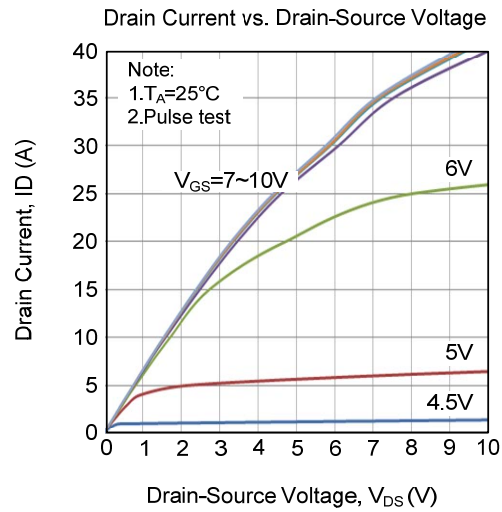
Unclamped Inductive Switching Test Circuit



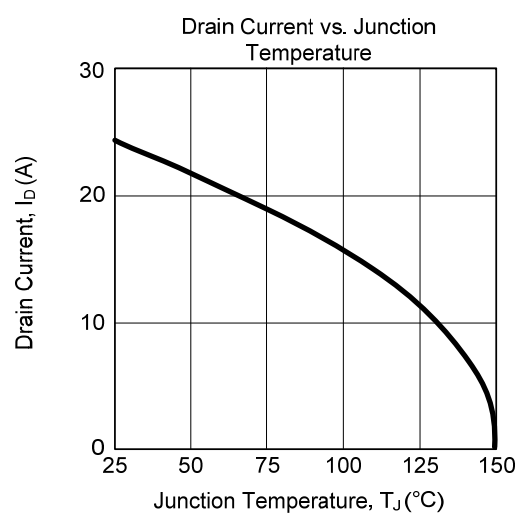
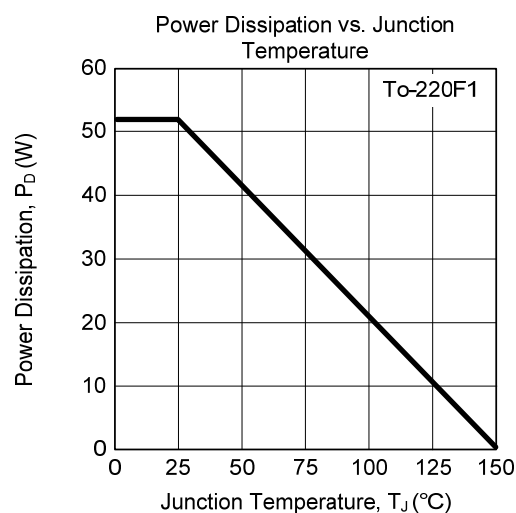
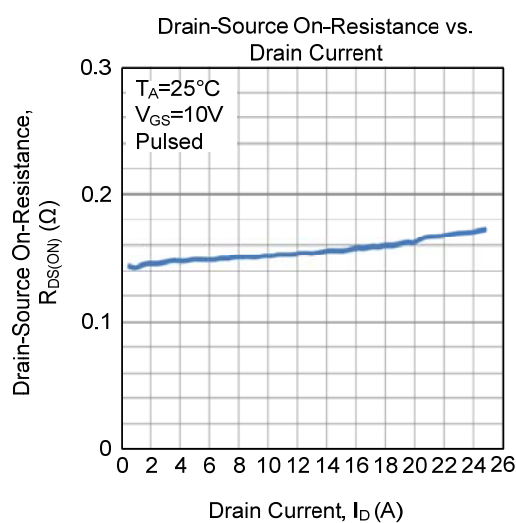
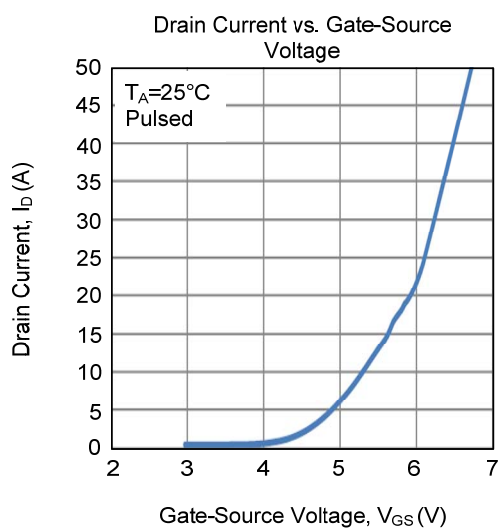
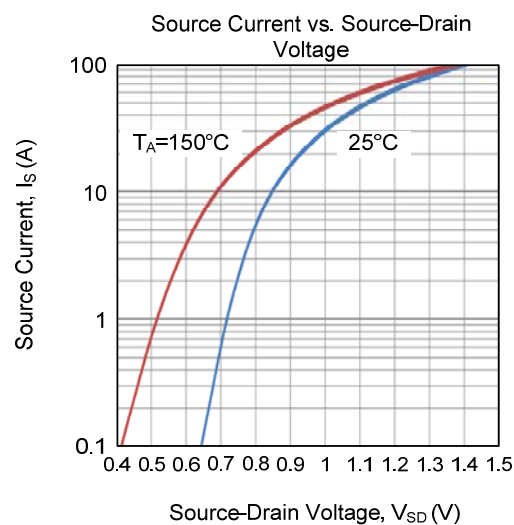
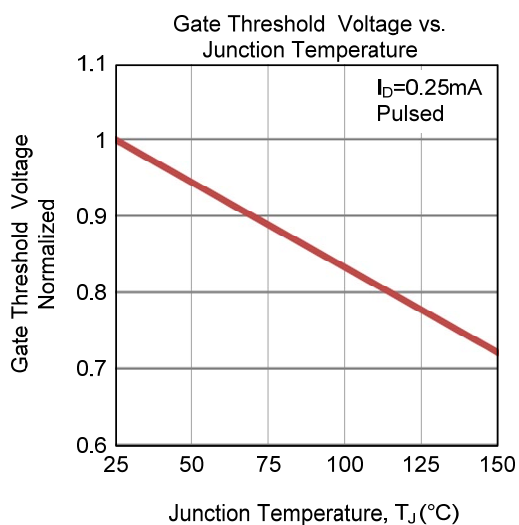
Unclamped Inductive Switching Waveforms



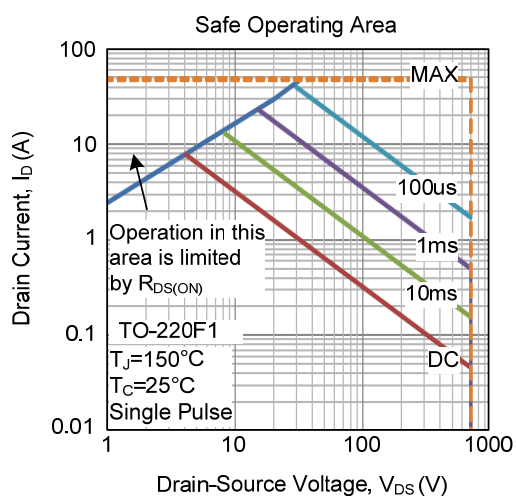
■ TYPICAL CHARACTERISTICS



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.