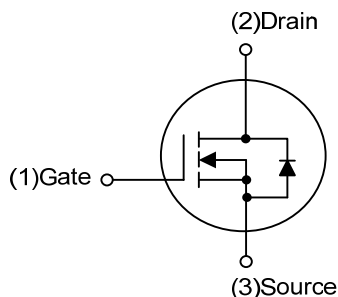


**UT90N09****Power MOSFET****90A, 90V N-CHANNEL
POWER MOSFET****DESCRIPTION**

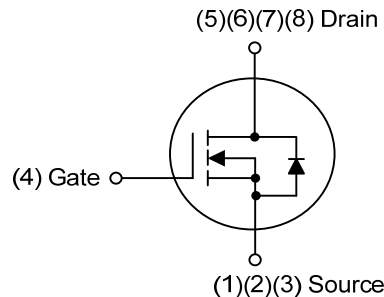
The UTC UT90N09 is a high voltage and high current power MOSFET, designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient AC to DC converters and bridge circuits.

FEATURES

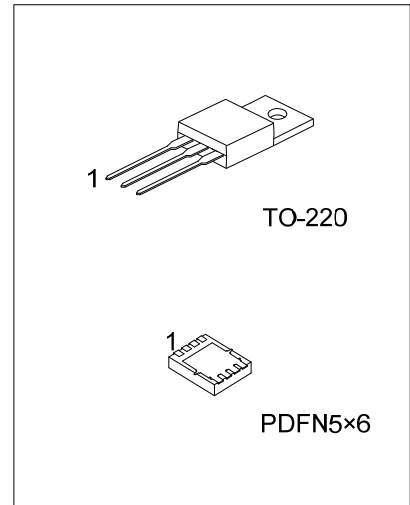
- * $R_{DS(ON)} \leq 11.5 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=45\text{A}$
- $R_{DS(ON)} \leq 12.8 \text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$, $I_D=20\text{A}$
- * Fast switching
- * 100% avalanche tested
- * Improved dv/dt capability

SYMBOL

TO-220



PDFN5×6

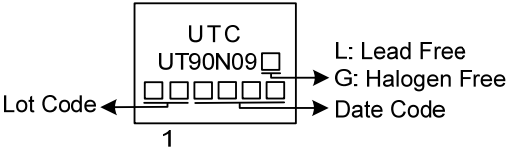
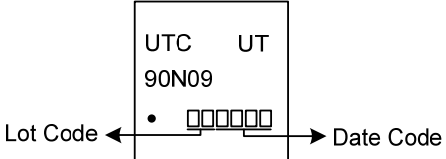
**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT90N09L-TA3-R	UT90N09G-TA3-R	TO-220	G	D	S	-	-	-	-	-	Tube
UT90N09L-P5060-R	UT90N09G-P5060-R	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

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

UT90N09G-TA3-R (1) Packing Type (2) Package Type (3) Green Package		(1) T: Tube, R: Tape Reel (2) TA3: TO-220, P5060: PDFN5×6 (3) G: Halogen Free and Lead Free, L: Lead Free
---	--	---

MARKING

TO-220	PDFN5×6
 Diagram of TO-220 marking: A rectangular package with 'UTC' and 'UT90N09' printed on top. Below the part number is a small square. To the left of the package is 'Lot Code' with an arrow pointing to a 5-digit code. To the right is 'Date Code' with an arrow pointing to a 4-digit code. Below the package is a small square with the number '1'. UTC UT90N09 Lot Code → [] [] [] [] [] [] [] [] [] [] → Date Code 1 L: Lead Free G: Halogen Free	 Diagram of PDFN5×6 marking: A rectangular package with 'UTC' and 'UT' printed on top, followed by '90N09'. Below the part number is a small square. To the left of the package is 'Lot Code' with an arrow pointing to a 5-digit code. To the right is 'Date Code' with an arrow pointing to a 4-digit code. UTC UT 90N09 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}	90	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current	Continuous	I_D	90	A
	Pulsed	I_{DM}	180	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	156	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.9	V/ns
Power Dissipation	TO-220	P_D	142	W
	PDFN5×6		42	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature Range		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. $L=0.1\text{mH}$, $I_{AS}=55.8\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J = 25^\circ\text{C}$
4. $I_{SD} \leq 30\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	PDFN5×6		65 (Note)	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	0.88	$^\circ\text{C}/\text{W}$
	PDFN5×6		2.97 (Note)	$^\circ\text{C}/\text{W}$

Note: The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

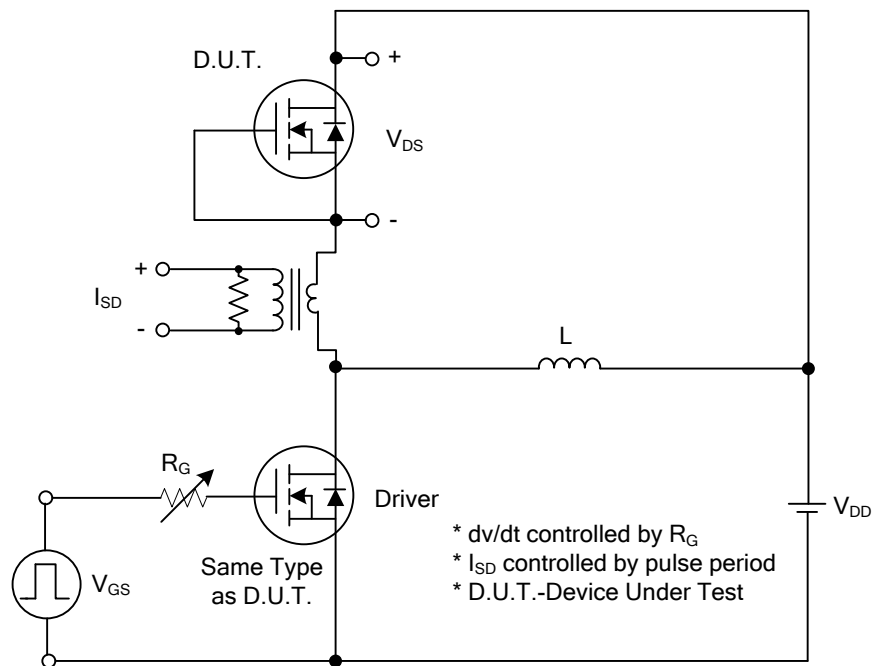
■ ELECTRICAL CHARACTERISTICS (T_C =25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	90			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =90V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} =+20V, V _{DS} =0V			+100	nA
	Reverse		V _{GS} =-20V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	1.0		3.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =45A			11.5	mΩ
			V _{GS} =4.5V, I _D =20A			12.8	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		3753		pF
Output Capacitance		C _{OSS}			335		pF
Reverse Transfer Capacitance		C _{RSS}			300		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =45V, V _{GS} =10V, I _D =90A, I _G =1mA (Note 1, 2)		111		nC
Gate to Source Charge		Q _{GS}			24.4		nC
Gate to Drain Charge		Q _{GD}			17.2		nC
Turn-ON Delay Time (Note 1)		t _{D(ON)}	V _{DD} =45V, V _{GS} =10V, I _D =90A, R _G =25Ω (Note 1, 2)		12.8		ns
Rise Time		t _R			20.8		ns
Turn-OFF Delay Time		t _{D(OFF)}			64		ns
Fall-Time		t _F			27.2		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				90	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				180	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =90A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)		t _{rr}	I _S =30A, V _{GS} =0V, dI/dt=100A/μs		62.4		ns
Reverse Recovery Charge		Q _{rr}			193		nC

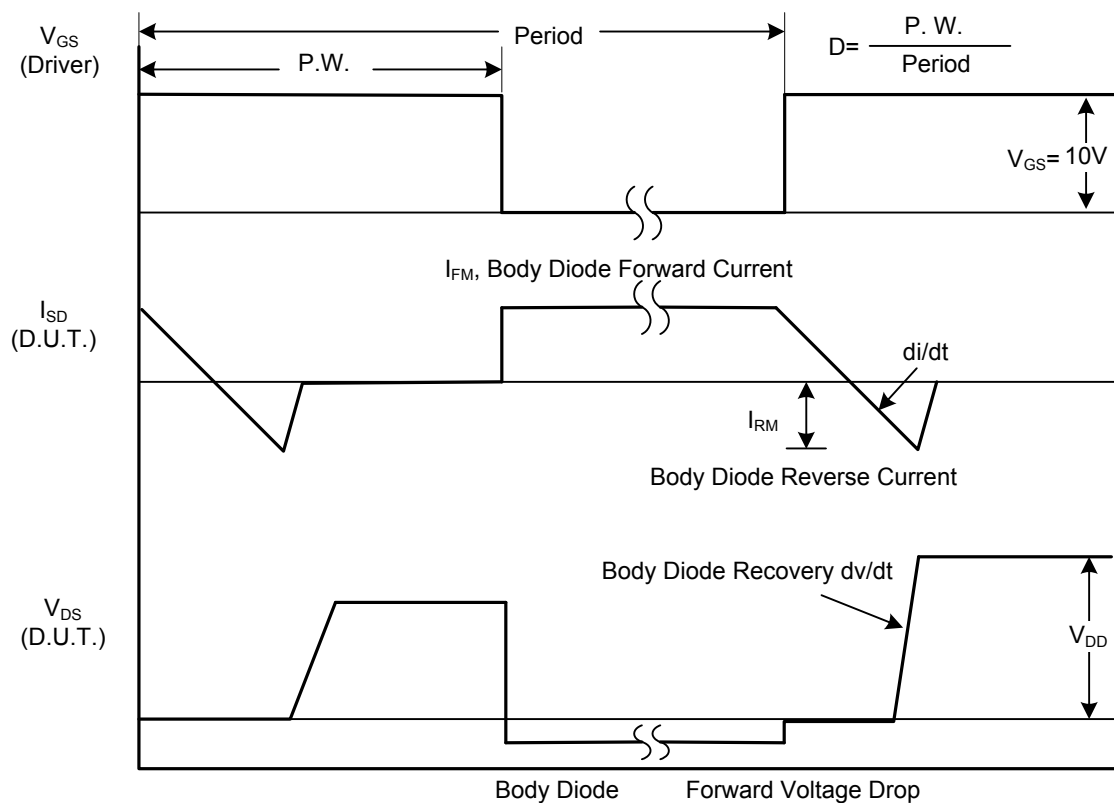
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

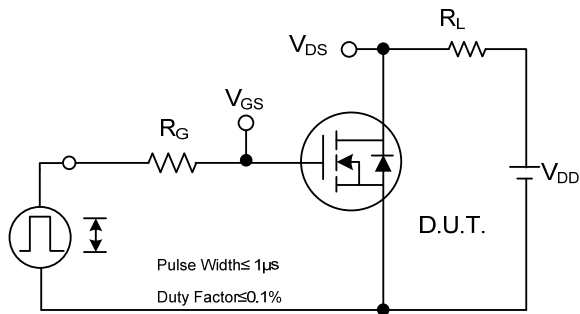


Peak Diode Recovery dv/dt Test Circuit

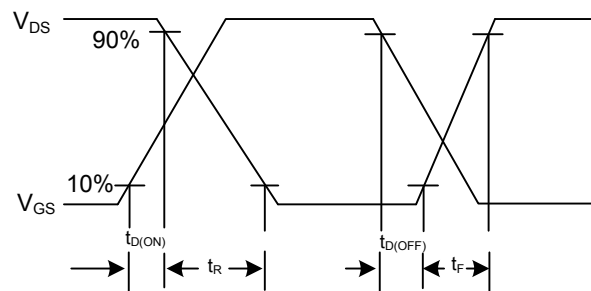


Peak Diode Recovery dv/dt Waveforms

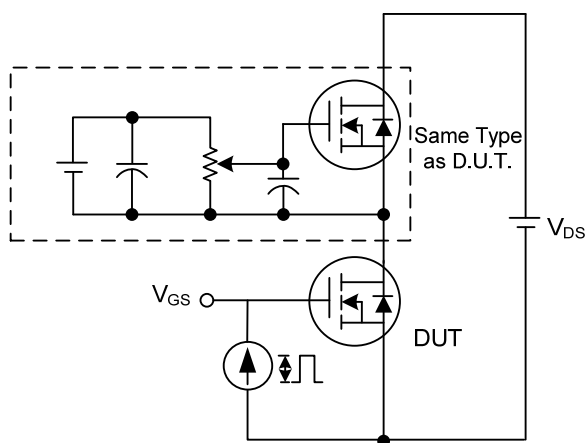
■ TEST CIRCUITS AND WAVEFORMS



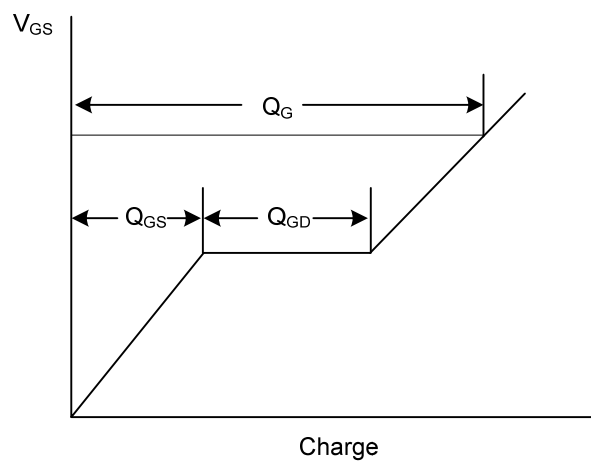
Switching Test Circuit



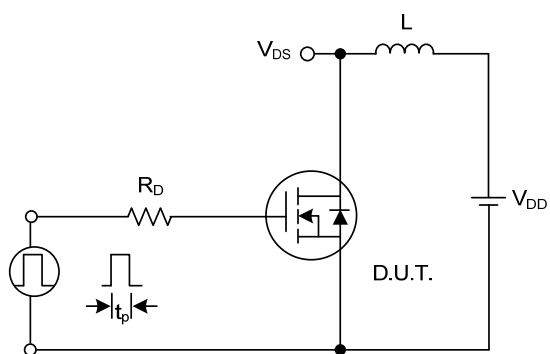
Switching Waveforms



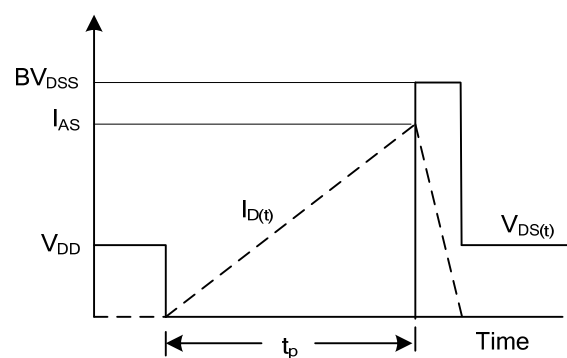
Gate Charge Test Circuit



Gate Charge Waveform

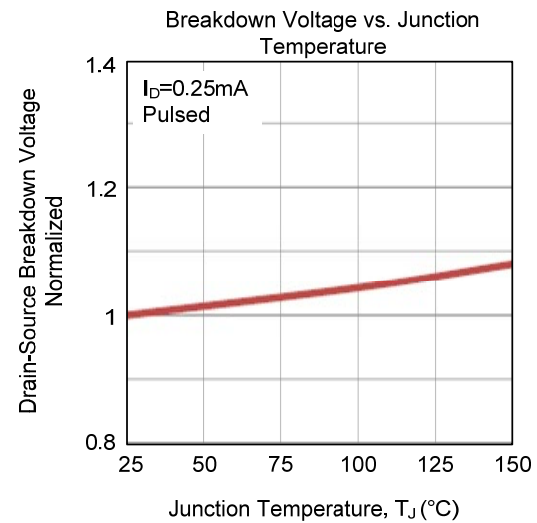
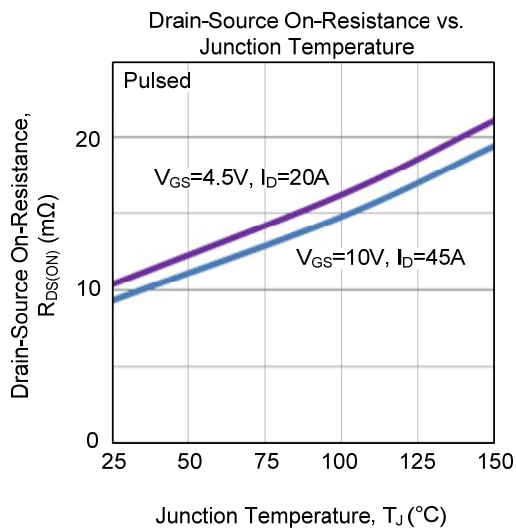
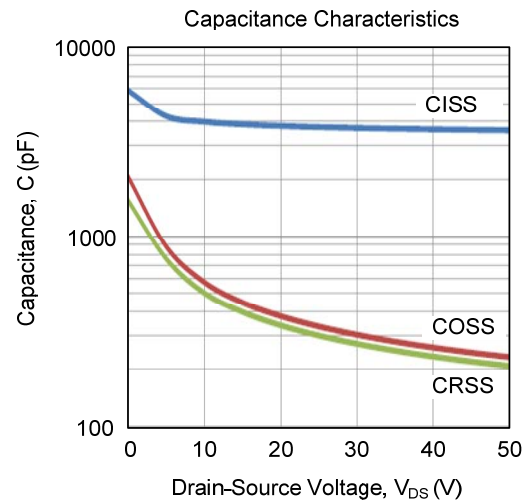
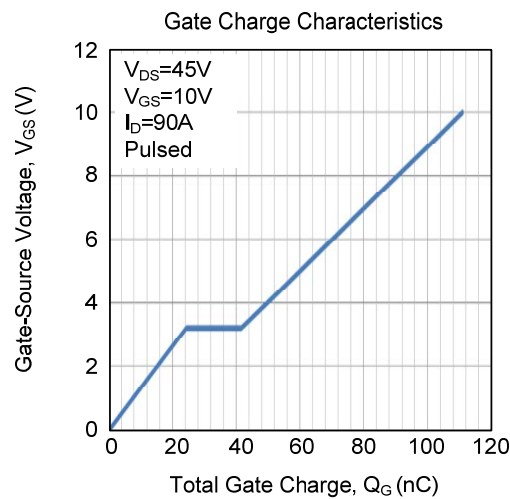
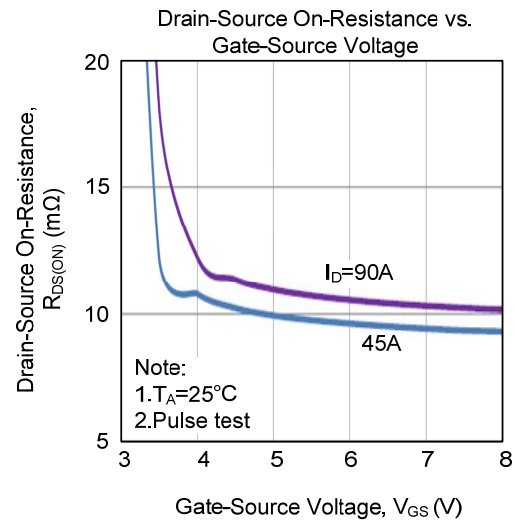
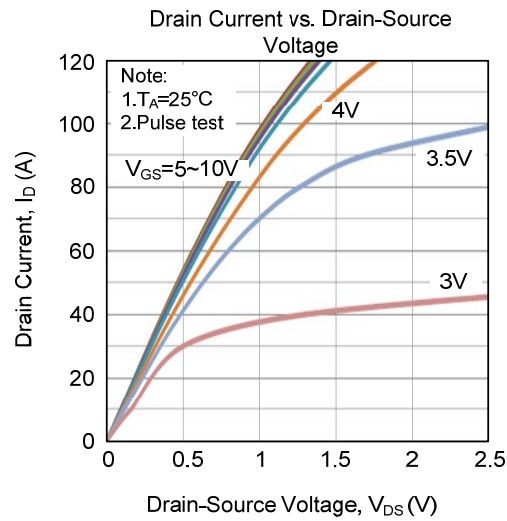


Unclamped Inductive Switching Test Circuit

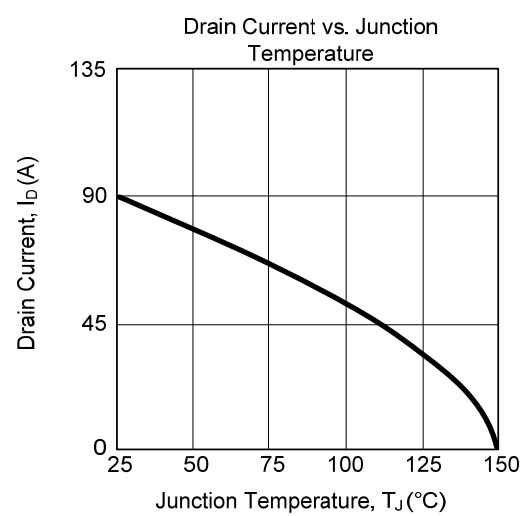
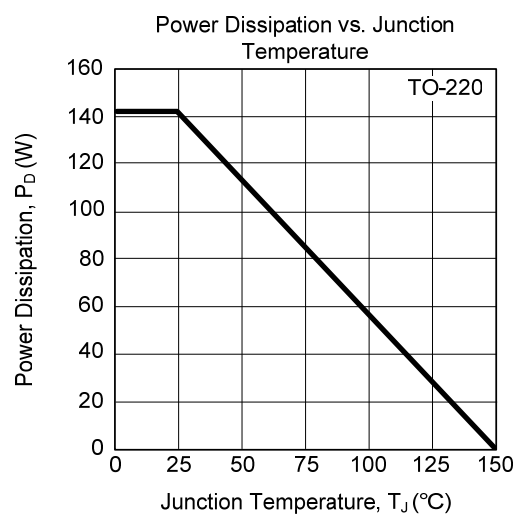
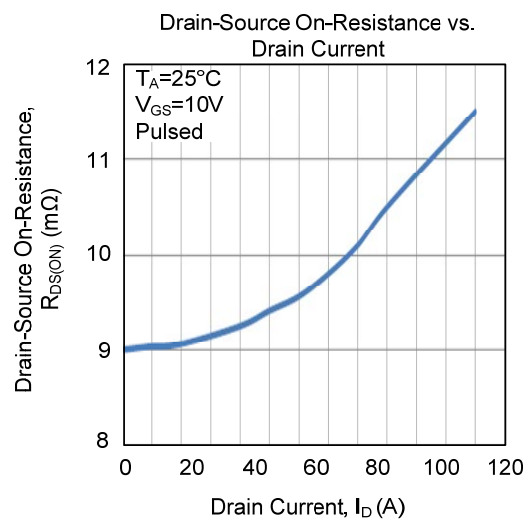
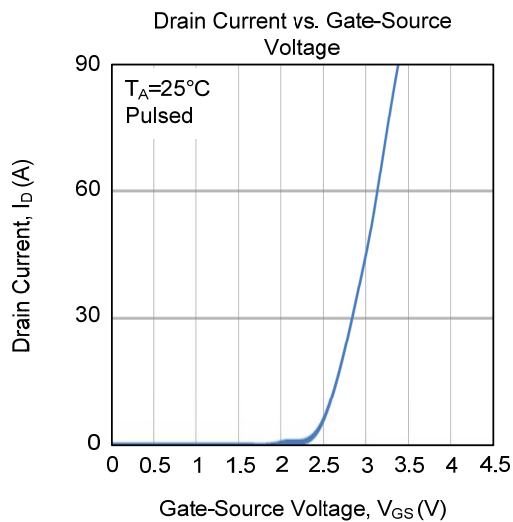
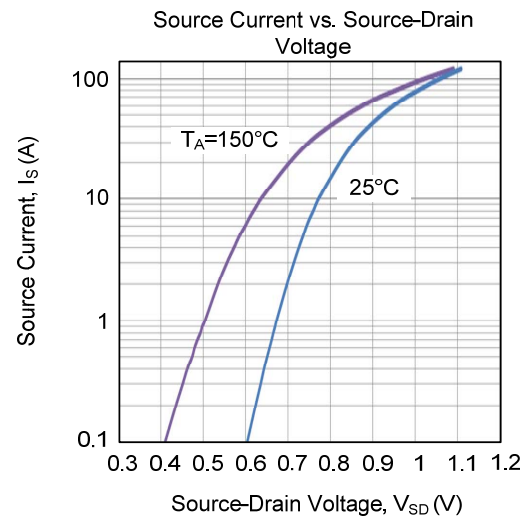
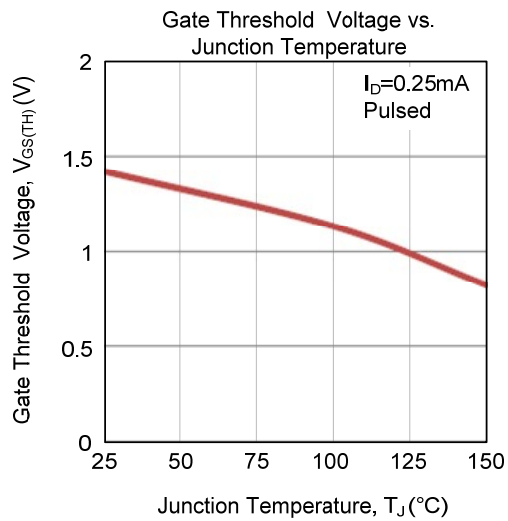


Unclamped Inductive Switching Waveforms

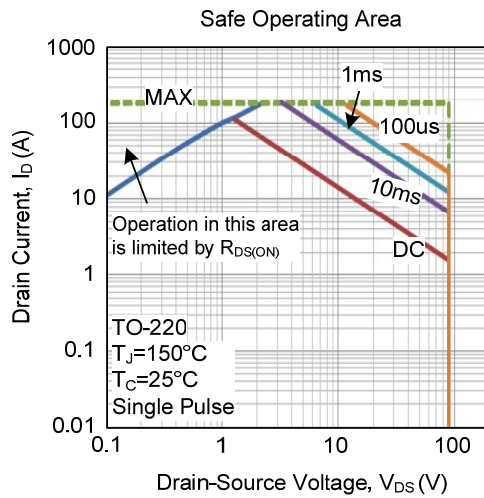
TYPICAL CHARACTERISTICS



■ 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.