



## 30NM90-Q

Power MOSFET

### 30A, 900V N-CHANNEL SUPER-JUNCTION MOSFET

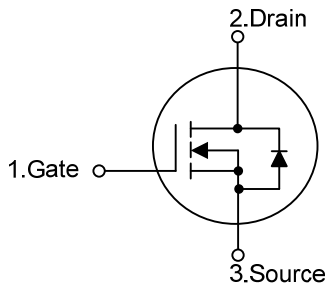
#### DESCRIPTION

The **UTC 30NM90-Q** 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

- \*  $R_{DS(ON)} \leq 0.28 \Omega @ V_{GS}=10V, I_D=15A$
- \* High Switching Speed
- \* 100% Avalanche Tested

#### SYMBOL

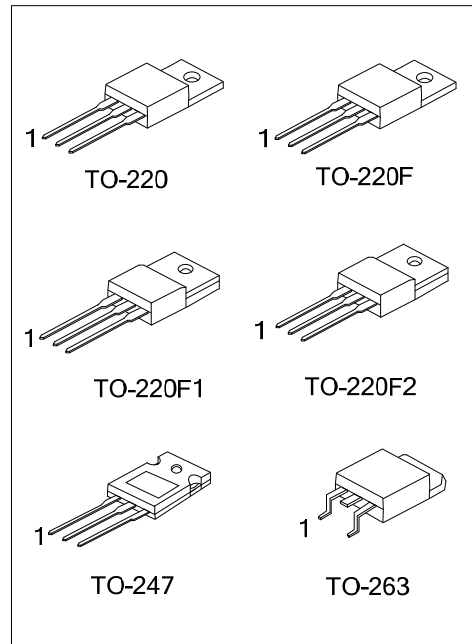


#### ORDERING INFORMATION

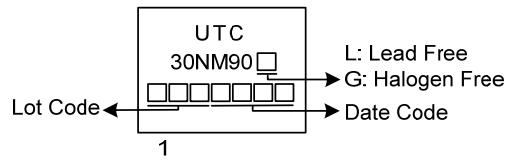
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
30NM90L-TA3-T	30NM90G-TA3-T	TO-220	G	D	S	Tube
30NM90L-TF1-T	30NM90G-TF1-T	TO-220F1	G	D	S	Tube
30NM90L-TF2-T	30NM90G-TF2-T	TO-220F2	G	D	S	Tube
30NM90L-TF3-T	30NM90G-TF3-T	TO-220F	G	D	S	Tube
30NM90L-T47-T	30NM90G-T47-T	TO-247	G	D	S	Tube
30NM90L-TQ2-T	30NM90G-TQ2-T	TO-263	G	D	S	Tube
30NM90L-TQ2-R	30NM90G-TQ2-R	TO-263	G	D	S	Tape Reel

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

<p>30NM90G-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, T47: TO-247, TQ2: TO-263</p> <p>(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		$V_{DSS}$	900	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Drain Current	Continuous	$I_D$	30	A
	Pulsed (Note 2)	$I_{DM}$	60	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	375	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	8.1	V/nS
Power Dissipation	TO-220/TO-263	$P_D$	130	W
	TO-220F/TO-220F1 TO-220F2		48	W
	TO-247		280	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.  $L = 30 \text{ mH}$ ,  $I_{AS} = 5.0\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\Omega$ , 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	RATING	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2 TO-263	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
	TO-247		50	$^\circ\text{C}/\text{W}$
	TO-220/TO-263		0.96 (Note)	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1 TO-220F2		2.6	$^\circ\text{C}/\text{W}$
Junction to Case	TO-247		0.44	$^\circ\text{C}/\text{W}$

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

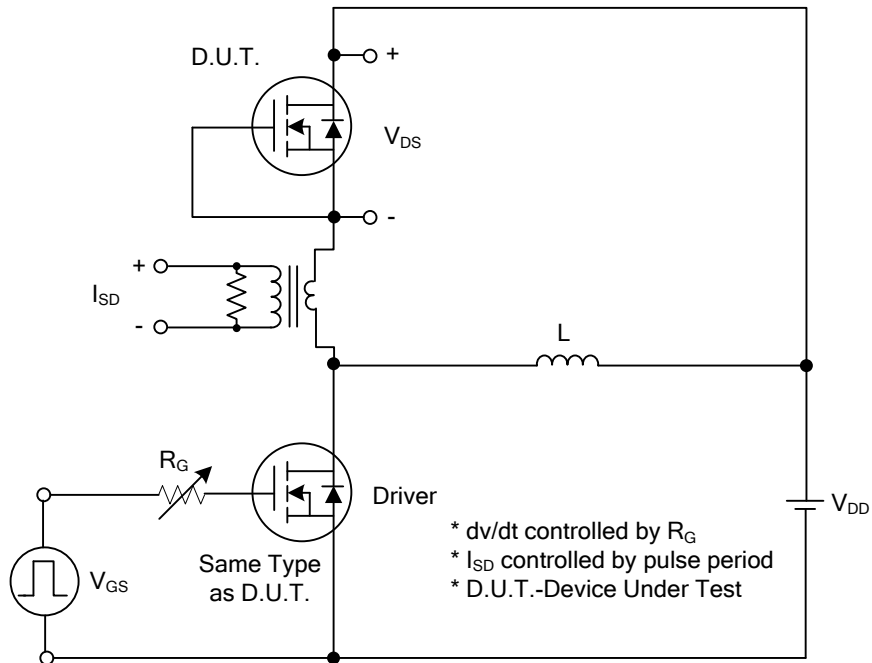
■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	900			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =900V, V <sub>GS</sub> =0V			10	μA
Gate- Source Leakage Current	Forward	I <sub>GSS</sub> V <sub>GS</sub> =+30V, V <sub>DS</sub> =0V			+100	nA
	Reverse				-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.5		4.5	V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =15A			0.28	Ω
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =50V, f=1.0MHz		2600		pF
Output Capacitance	C <sub>OSS</sub>			140		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			1.8		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge (Note 1)	Q <sub>G</sub>	V <sub>DS</sub> =720V, V <sub>GS</sub> =10V, I <sub>D</sub> =30A I <sub>G</sub> =1mA (Note1, 2)		92		nC
Gate to Source Charge	Q <sub>GS</sub>			24		nC
Gate to Drain Charge	Q <sub>GD</sub>			38		nC
Turn-ON Delay Time (Note 1)	t <sub>D(ON)</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =10V, I <sub>D</sub> =30A, R <sub>G</sub> =25Ω (Note1, 2)		35		ns
Rise Time	t <sub>R</sub>			25		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			220		ns
Fall-Time	t <sub>F</sub>			58		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>				30	A
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				60	A
Drain-Source Diode Forward Voltage (Note 1)	V <sub>SD</sub>	I <sub>S</sub> =30A, V <sub>GS</sub> =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t <sub>rr</sub>	I <sub>S</sub> =30A, V <sub>GS</sub> =0V, dI <sub>F</sub> /dt=100A/μs		960		ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>				23.1	

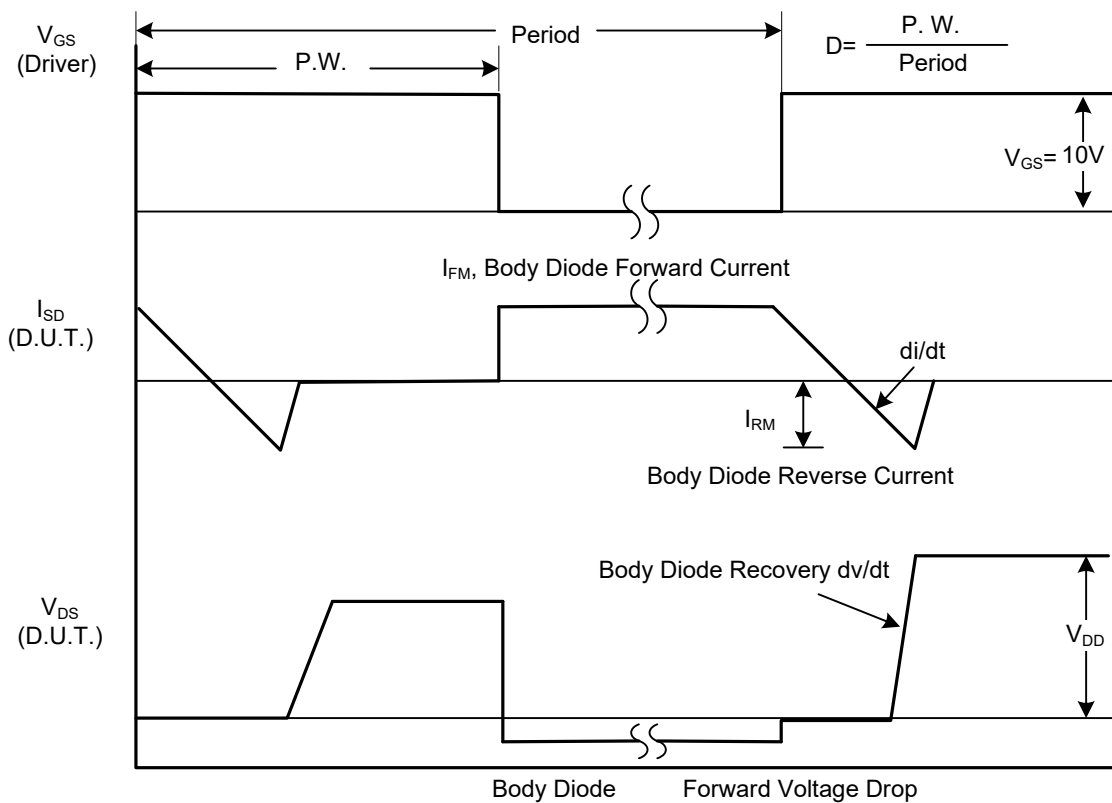
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating ambient temperature.

## ■ TEST CIRCUITS AND WAVEFORMS



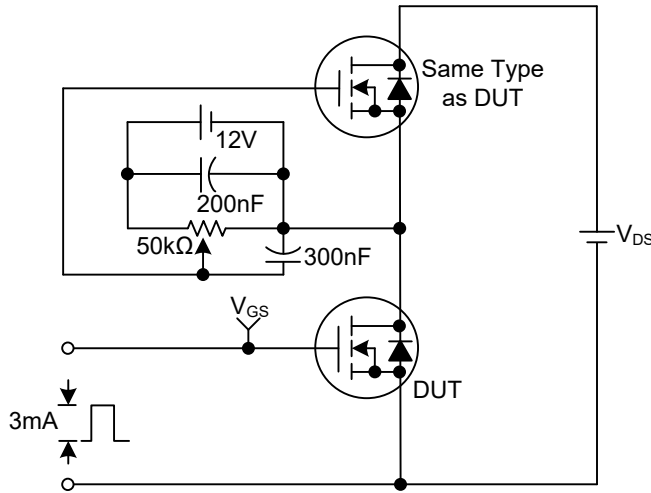
**Peak Diode Recovery dv/dt Test Circuit**



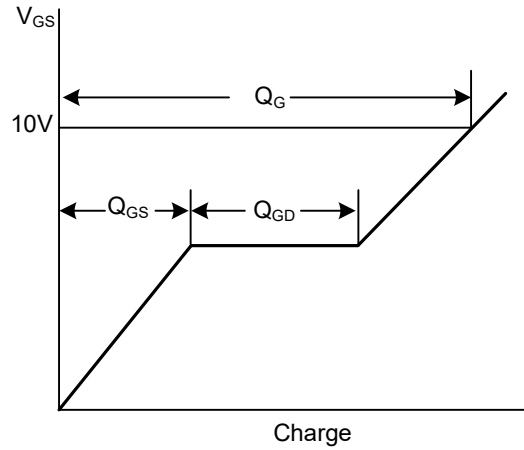
**Peak Diode Recovery dv/dt Waveforms**

## TEST CIRCUITS AND WAVEFORMS

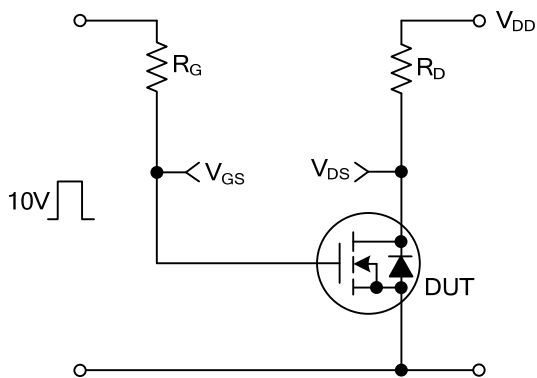
Gate Charge Test Circuit



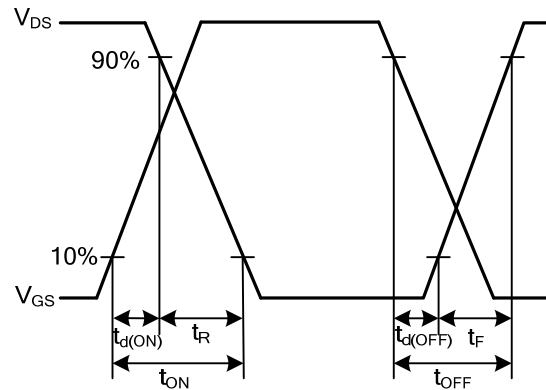
Gate Charge Waveforms



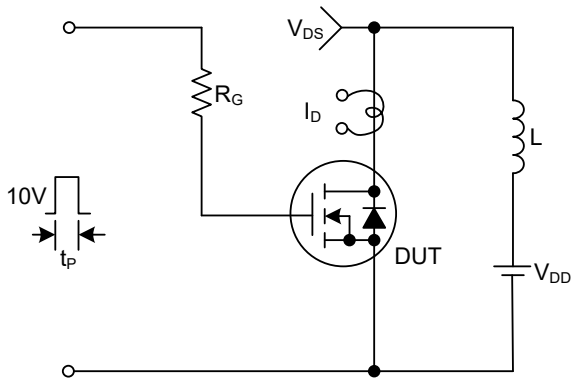
Resistive Switching Test Circuit



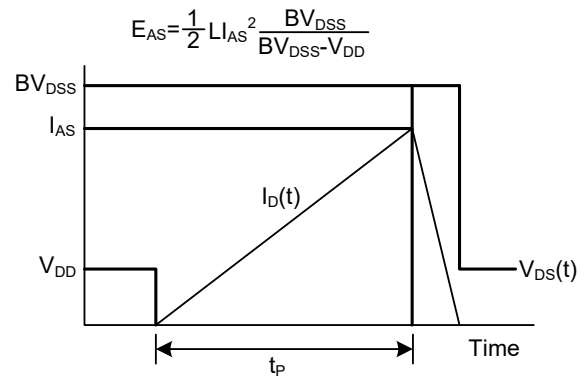
Resistive Switching Waveforms



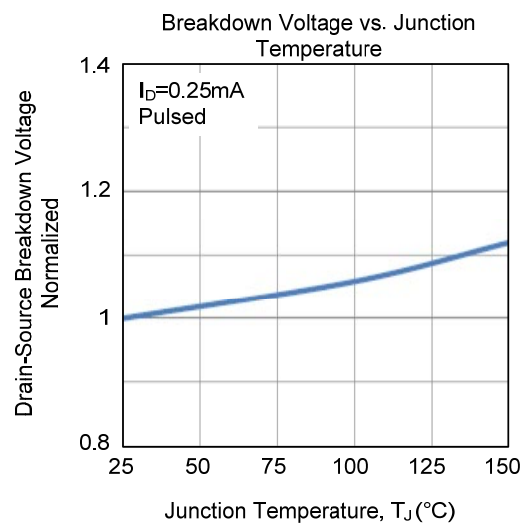
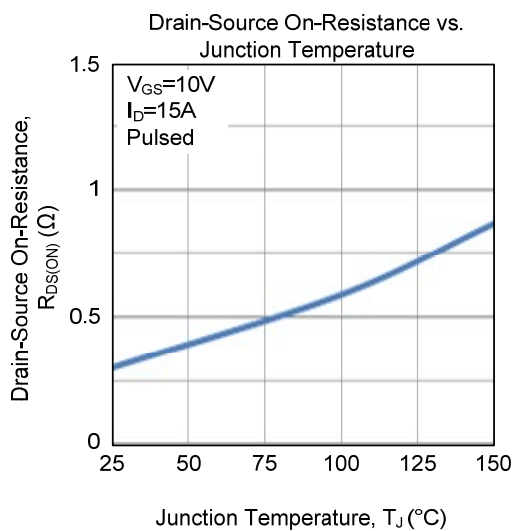
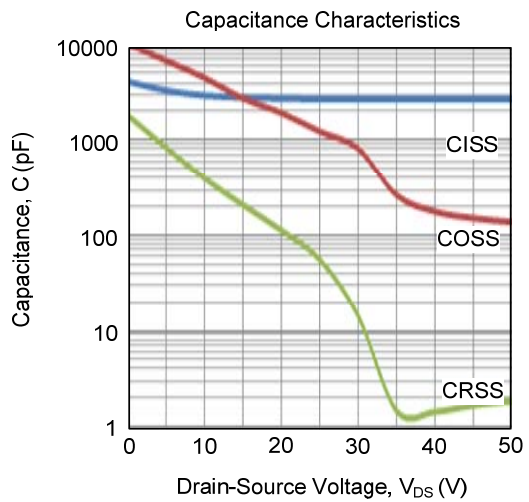
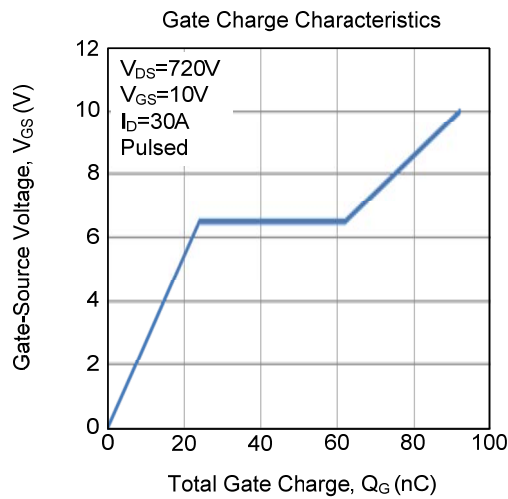
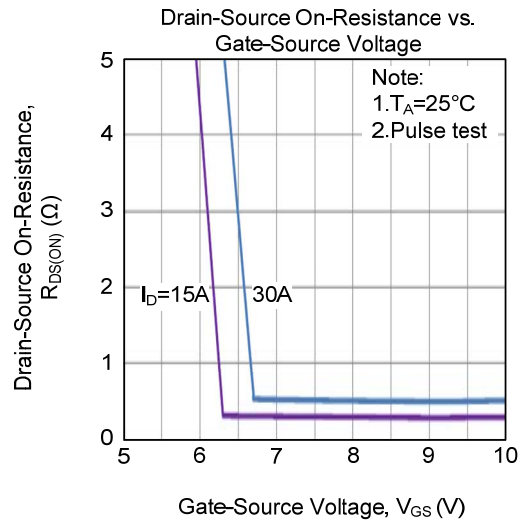
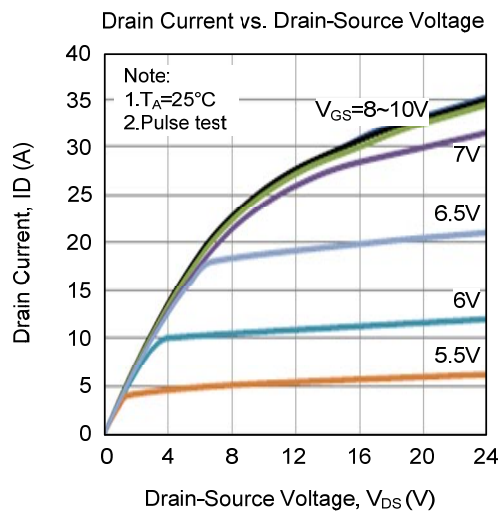
Unclamped Inductive Switching Test Circuit



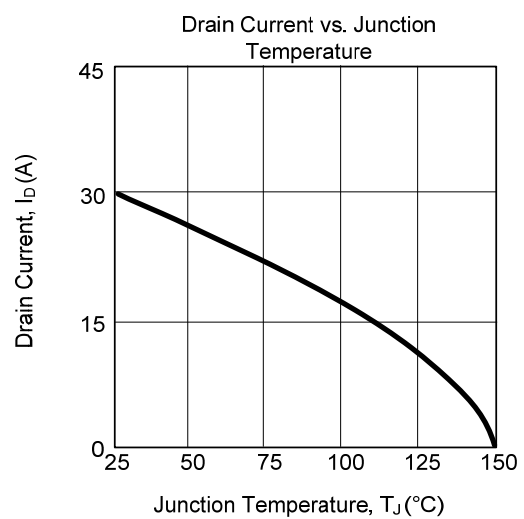
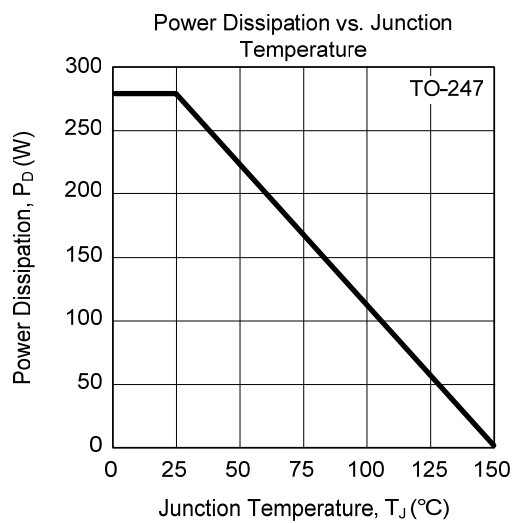
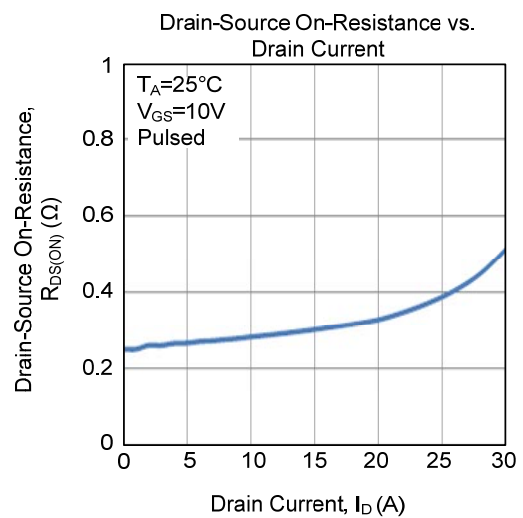
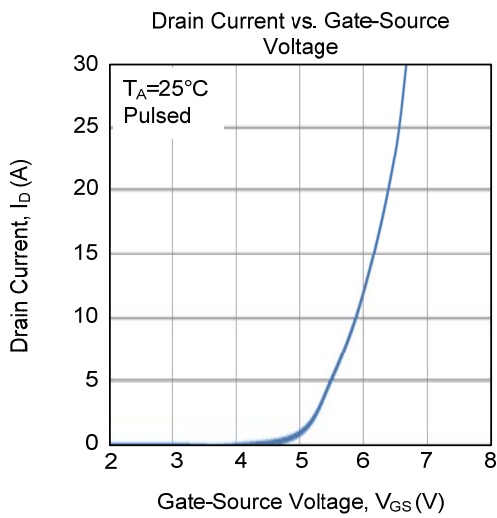
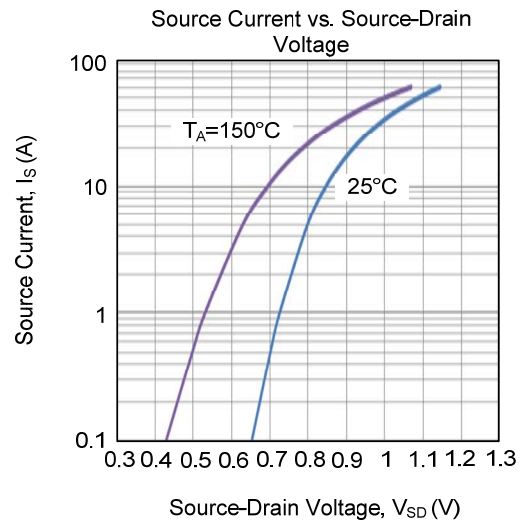
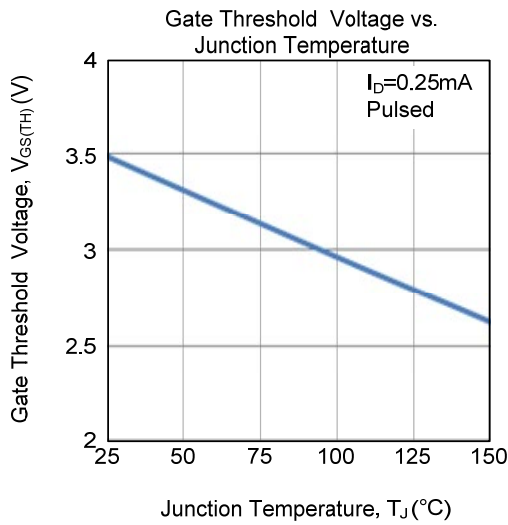
Unclamped Inductive Switching Waveforms



## TYPICAL CHARACTERISTICS

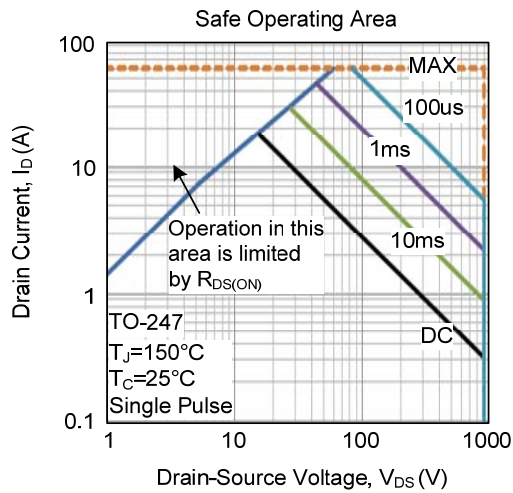


## ■ TYPICAL CHARACTERISTICS (Cont.)





■ 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.