



UNISONIC TECHNOLOGIES CO., LTD

UT3415

POWER MOSFET

-4A, -20V P-CHANNEL POWER MOSFET

■ DESCRIPTION

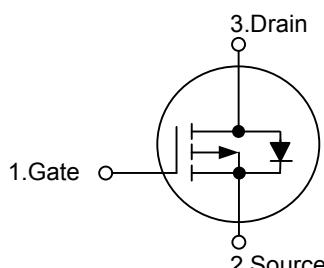
The UTC **UT3415** is a P-channel MOS Field Effect Transistor. It uses UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance.

The UTC **UT3415** is suitable for high voltage switching applications.

■ FEATURES

- * $R_{DS(ON)} \leq 45m\Omega$ @ $V_{GS}=-4.5V$, $I_D=-4.0A$
- $R_{DS(ON)} \leq 62m\Omega$ @ $V_{GS}=-2.5V$, $I_D=-4.0A$
- $R_{DS(ON)} \leq 84m\Omega$ @ $V_{GS}=-1.8V$, $I_D=-2.0A$
- $R_{DS(ON)} \leq 105m\Omega$ @ $V_{GS}=-1.5V$, $I_D=-1.0A$
- * High switching speed
- * Low input capacitance

■ SYMBOL



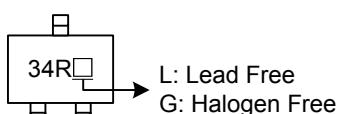
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UT3415L-AE3-R	UT3415G-AE3-R	SOT-23	G	S	D	Tape Reel

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

UT3415G-AE3-R	(1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) AE3: SOT-23 (3) G: Halogen Free and Lead Free, L: Lead Free
---------------	--	--

■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	-20	V
Gate-Source Voltage		V_{GSS}	± 8	V
Drain Current	DC	I_D	-4	A
	Pulsed (Note 2)	I_{DM}	-8	A
Single Avalanche Energy (Note 3)		E_{AS}	48	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.38	V/ns
Power Dissipation		P_D	1.5	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=10mH, $I_{AS}=-3.1\text{A}$, $V_{DD}=-50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$.

4. $I_{SD} \leq -1.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	90	$^\circ\text{C/W}$

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

UT3415

POWER MOSFET

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{\text{GS}}=0\text{ V}, I_{\text{D}}=-250\text{ }\mu\text{A}$	-20			V
Drain-Source Leakage Current	I_{DSS}	$V_{\text{DS}}=-20\text{V}, V_{\text{GS}}=0\text{V}$			-1.0	μA
Gate-Source Leakage Current	Forward	$V_{\text{GS}}=+8\text{V}, V_{\text{DS}}=0\text{V}$			+100	nA
	Reverse	$V_{\text{GS}}=-8\text{V}, V_{\text{DS}}=0\text{V}$			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{\text{GS(TH)}}$	$V_{\text{DS}}=V_{\text{GS}}, I_{\text{D}}=250\mu\text{A}$	-0.3		-0.9	V
Static Drain-Source On-State Resistance	$R_{\text{DS(ON)}}$	$V_{\text{GS}}=-4.5\text{V}, I_{\text{D}}=-4.0\text{A}$			45	$\text{m}\Omega$
		$V_{\text{GS}}=-2.5\text{V}, I_{\text{D}}=-4.0\text{A}$			62	$\text{m}\Omega$
		$V_{\text{GS}}=-1.8\text{V}, I_{\text{D}}=-2.0\text{A}$			84	$\text{m}\Omega$
		$V_{\text{GS}}=-1.5\text{V}, I_{\text{D}}=-1.0\text{A}$			105	$\text{m}\Omega$
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{\text{GS}}=0\text{V}, V_{\text{DS}}=-10\text{V}, f=1.0\text{MHz}$			1660	pF
Output Capacitance	C_{OSS}				215	pF
Reverse Transfer Capacitance	C_{RSS}				205	pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{\text{DS}}=-20\text{V}, V_{\text{GS}}=-10\text{V}, I_{\text{D}}=-4.0\text{A}, I_{\text{G}}=-1\text{mA}$ (Note 1, 2)			85	nC
Gate to Source Charge	Q_{GS}				2.6	nC
Gate to Drain Charge	Q_{GD}				8.8	nC
Turn-ON Delay Time	$t_{\text{D(ON)}}$	$V_{\text{DD}}=-20\text{V}, V_{\text{GS}}=-10\text{V}, I_{\text{D}}=-4.0\text{A}, R_{\text{G}}=25\Omega$ (Note 1, 2)			8	ns
Rise Time	t_R				21.6	ns
Turn-OFF Delay Time	$t_{\text{D(OFF)}}$				376	ns
Fall-Time	t_F				137	ns
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				-4	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				-8	A
Diode Forward Voltage	V_{SD}	$I_F=-4.0\text{A}, V_{\text{GS}}=0\text{V}$			-1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F=-4.0\text{A}, V_{\text{GS}}=0\text{V}, \text{di/dt}=100\text{A}/\mu\text{s}$			2616	ns
Body Diode Reverse Recovery Charge	Q_{rr}				15.5	nC

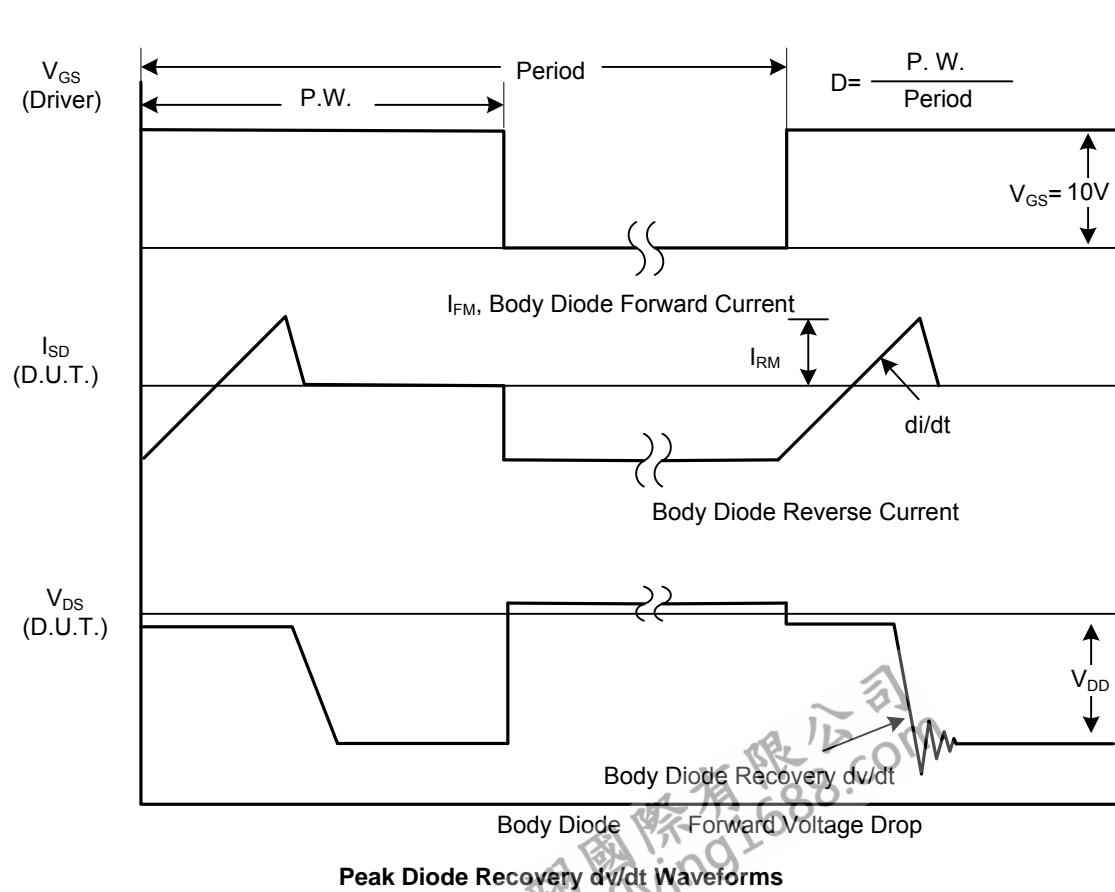
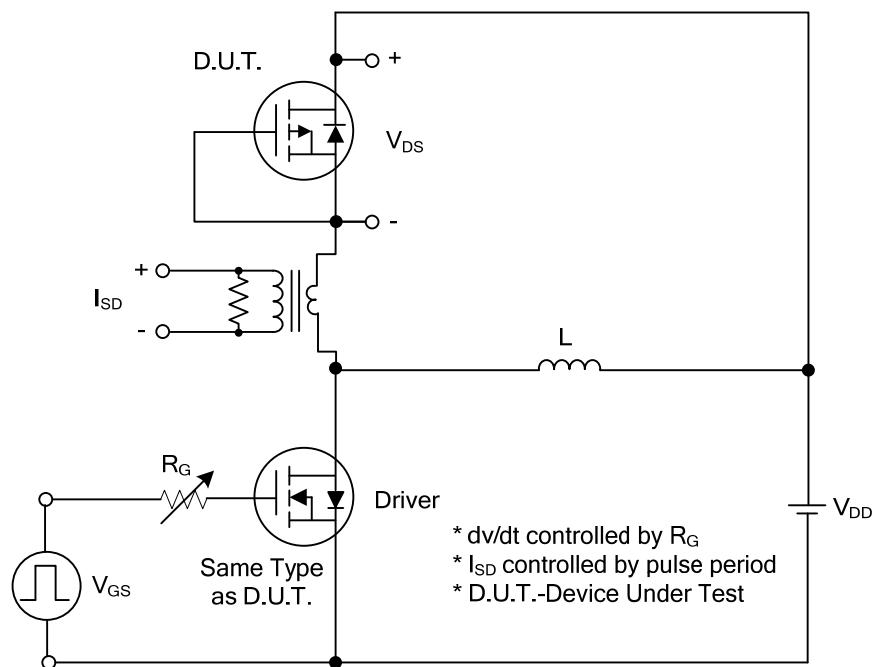
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

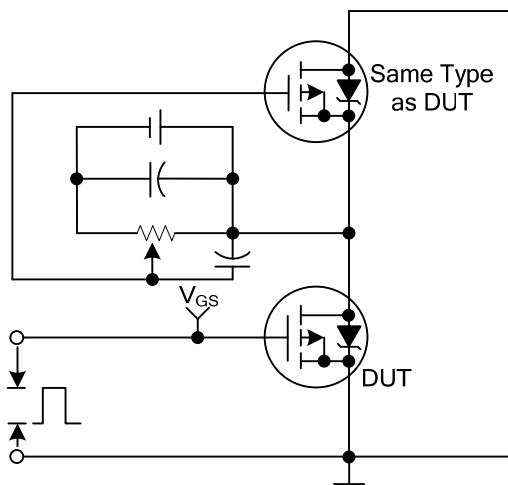


UNISONIC TECHNOLOGIES CO., LTD
www.unisonic.com.tw

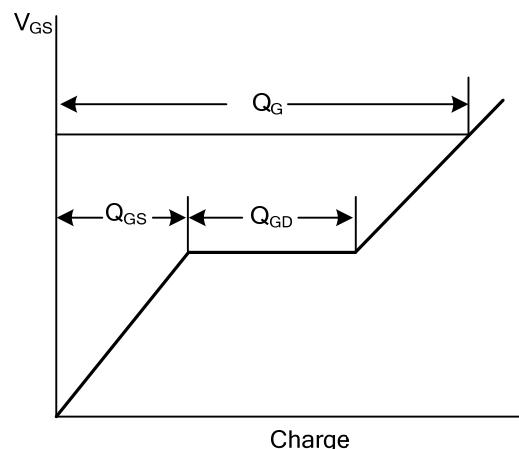
■ TEST CIRCUITS AND WAVEFORMS



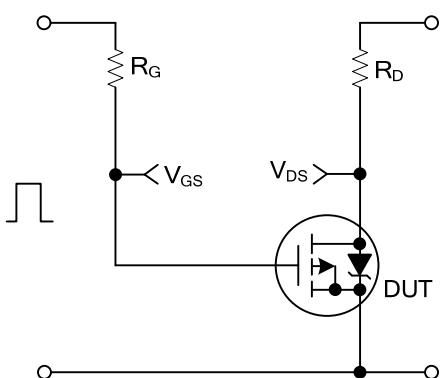
■ TEST CIRCUITS AND WAVEFORMS



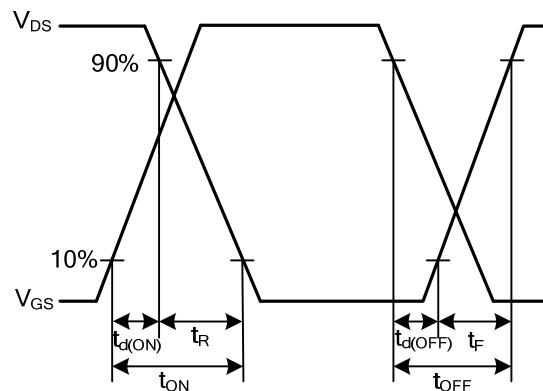
Gate Charge Test Circuit



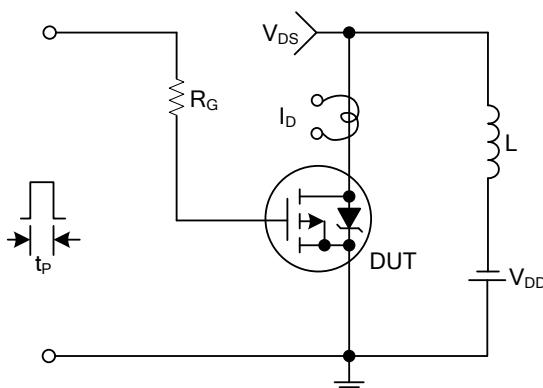
Gate Charge Waveforms



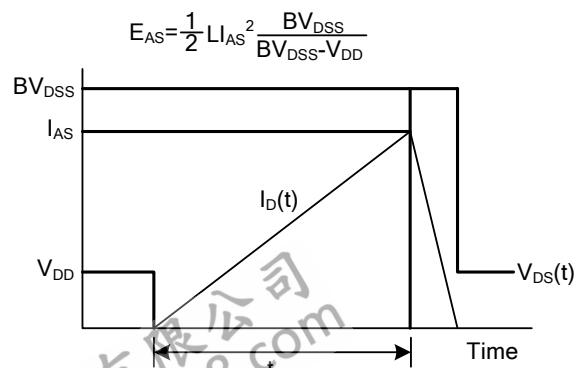
Resistive Switching Test Circuit



Resistive Switching Waveforms

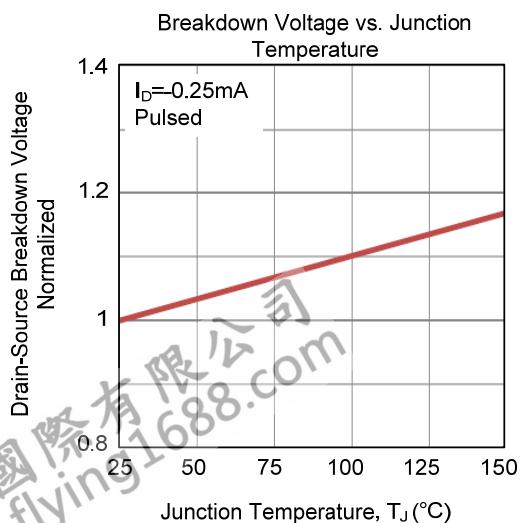
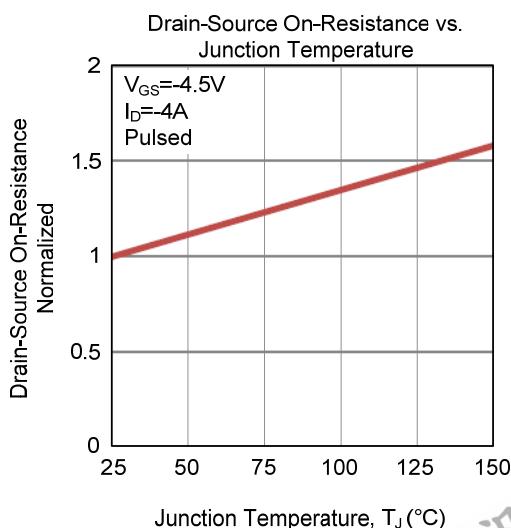
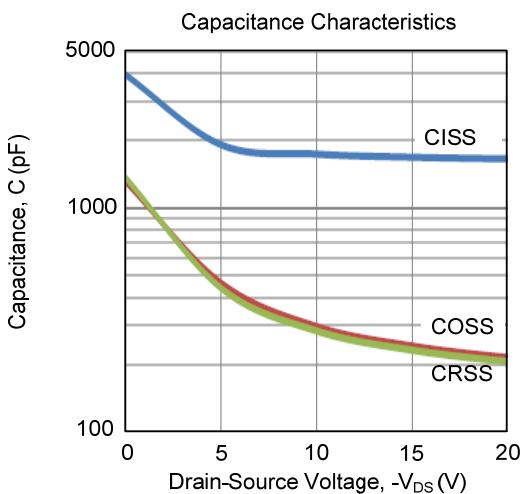
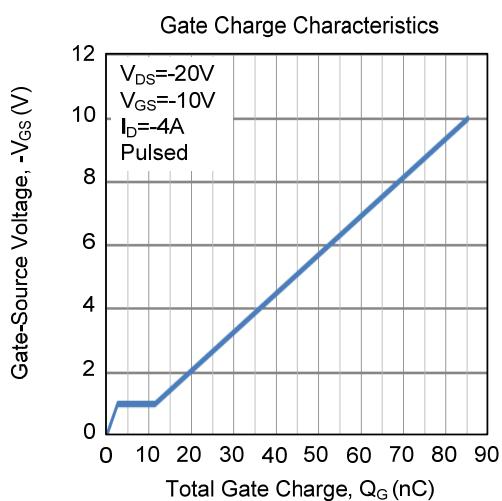
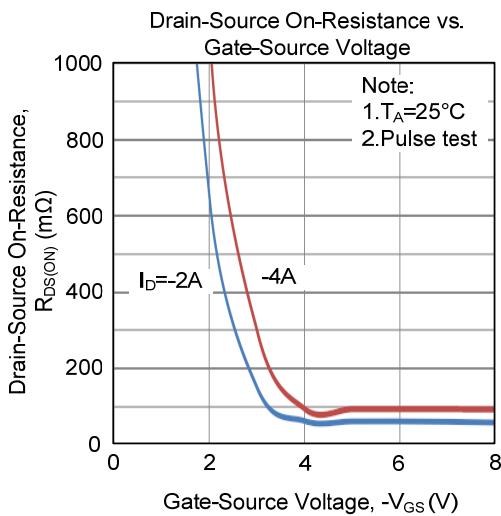
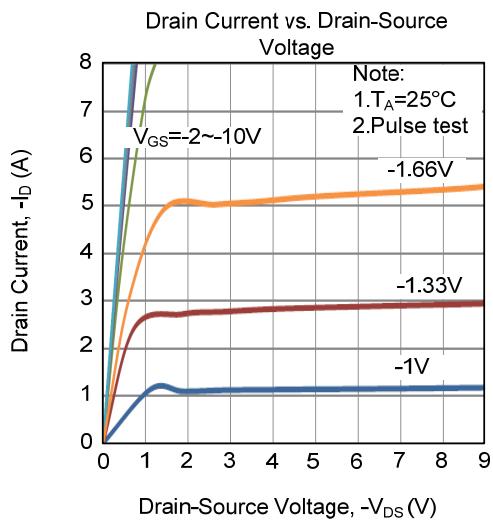


Unclamped Inductive Switching Test Circuit

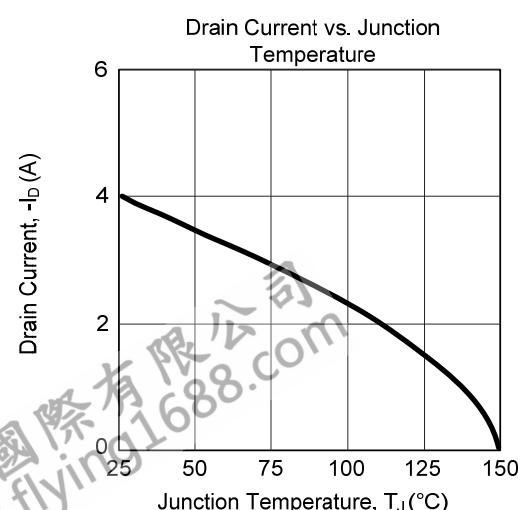
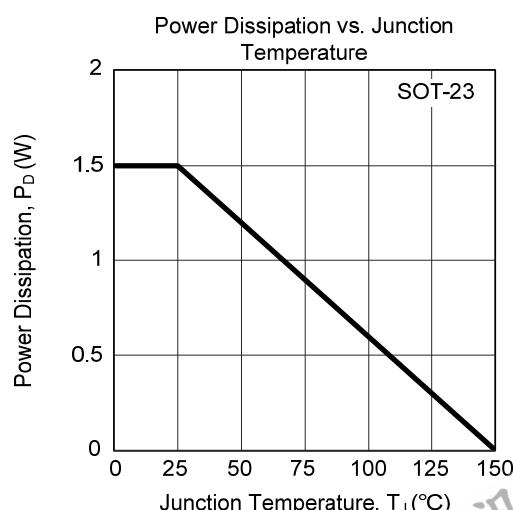
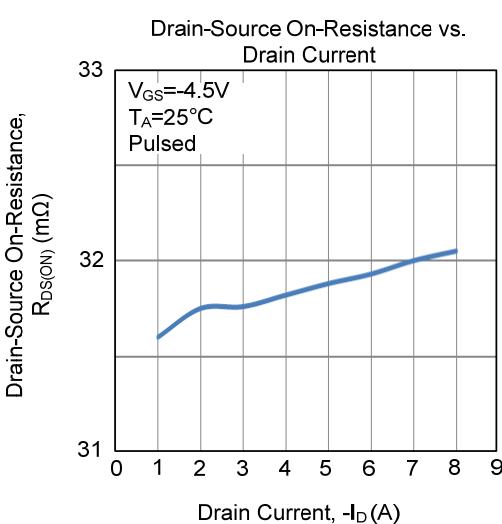
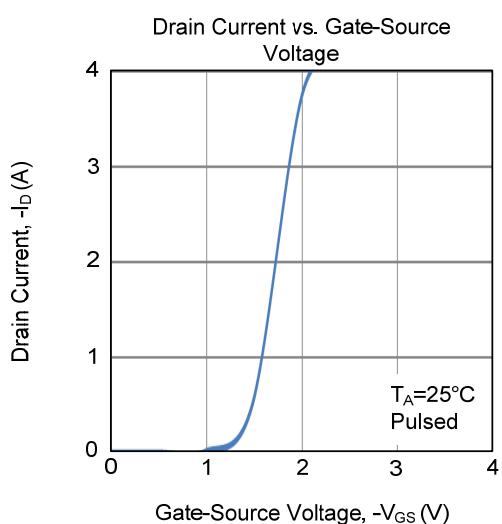
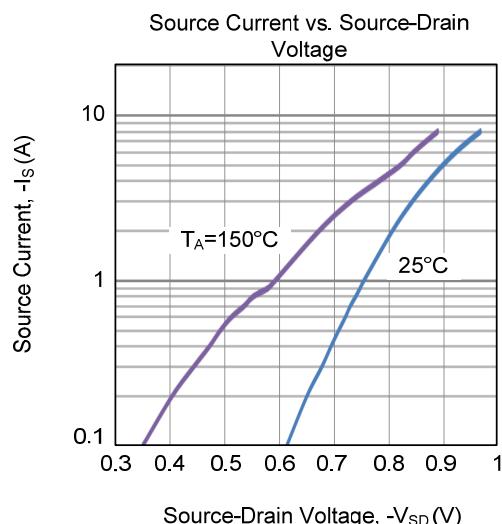
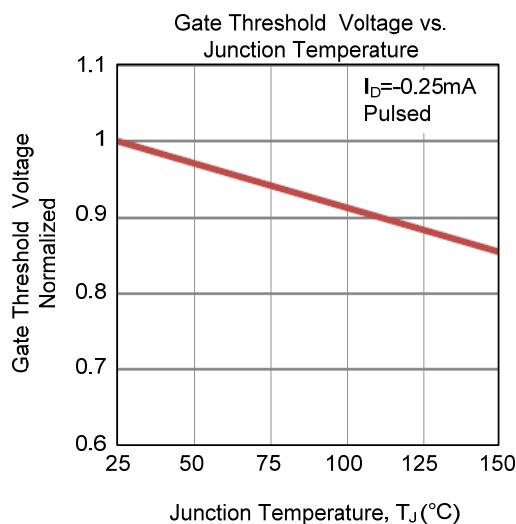


Unclamped Inductive Switching Waveforms

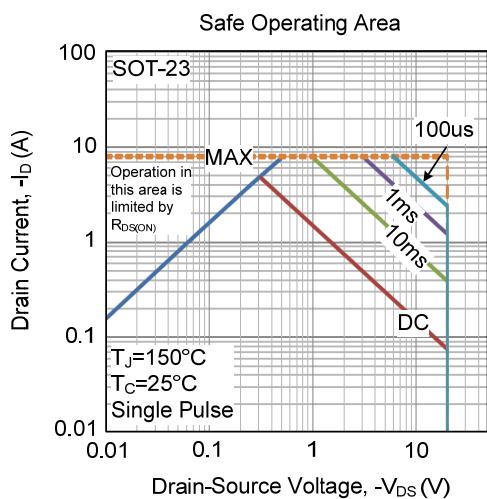
■ TYPICAL CHARACTERISTICS



■ 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.