



1N65A

Power MOSFET

0.5A, 650V N-CHANNEL POWER MOSFET

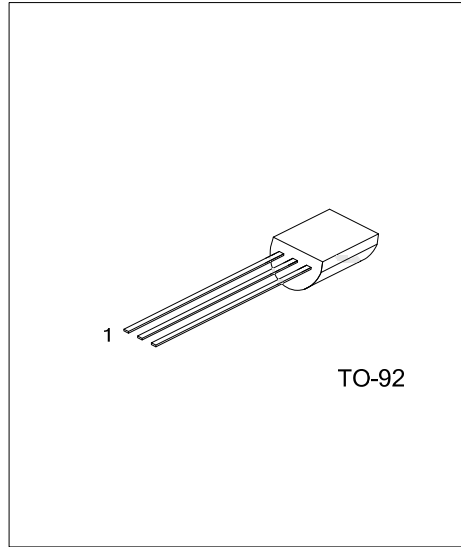
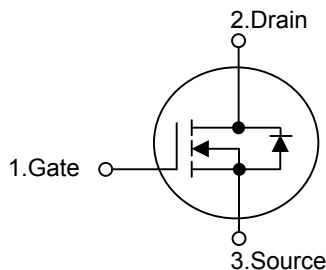
DESCRIPTION

The UTC **1N65A** is a high voltage power MOSFET designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and high rugged avalanche characteristics. This power MOSFET is usually used in high speed switching applications at power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

FEATURES

- * $V_{DS} = 650V$
- * $I_D = 0.5A$
- * $R_{DS(ON)} = 15\Omega @ V_{GS} = 10V$.
- * Ultra Low gate charge (typical 8.0nC)
- * Low reverse transfer capacitance ($C_{RSS} = 3.0 pF(max)$)
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

SYMBOL



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
1N65AL-T92-B	1N65AG-T92-B	TO-92	G	D	S	Tape Box
1N65AL-T92-K	1N65AG-T92-K	TO-92	G	D	S	Bulk

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

1N65AL-T92-B (1) Packing Type (2) Package Type (3) Lead Free	(1) B: Tape Box, K: Bulk (2) T92: TO-92 (3) G: Halogen Free, L: Lead Free
--	--

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

PARAMETER		SYMBOL	RATINGS		UNIT
Drain-Source Voltage		V _{DSS}	650		V
Gate-Source Voltage		V _{GSS}	±30		V
Continuous Drain Current		I _D	0.5		A
Pulsed Drain Current (Note 2)		I _{DM}	2		A
Avalanche Energy	Single Pulse(Note 3)	E _{AS}	50		mJ
	Repetitive(Note 2)	E _{AR}	3.6	4.0	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5		V/ns
Power Dissipation (T _C =25°C)		P _D	3		W
Derate above 25°C			25		mW/°C
Junction Temperature		T _J	+150		°C
Operating Temperature		T _{OPR}	-55 ~ +150		°C
Storage Temperature		T _{STG}	-55 ~ +150		°C

Note: 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. $L=92\text{mH}$, $I_{AS}=0.8\text{A}$, $V_{DD}=50\text{V}$, $R_G=0\Omega$, Starting $T_J=25^\circ\text{C}$

4. $I_{SD} \leq 1.0\text{A}$, $di/dt \leq 100\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	120	$^\circ\text{C}/\text{W}$

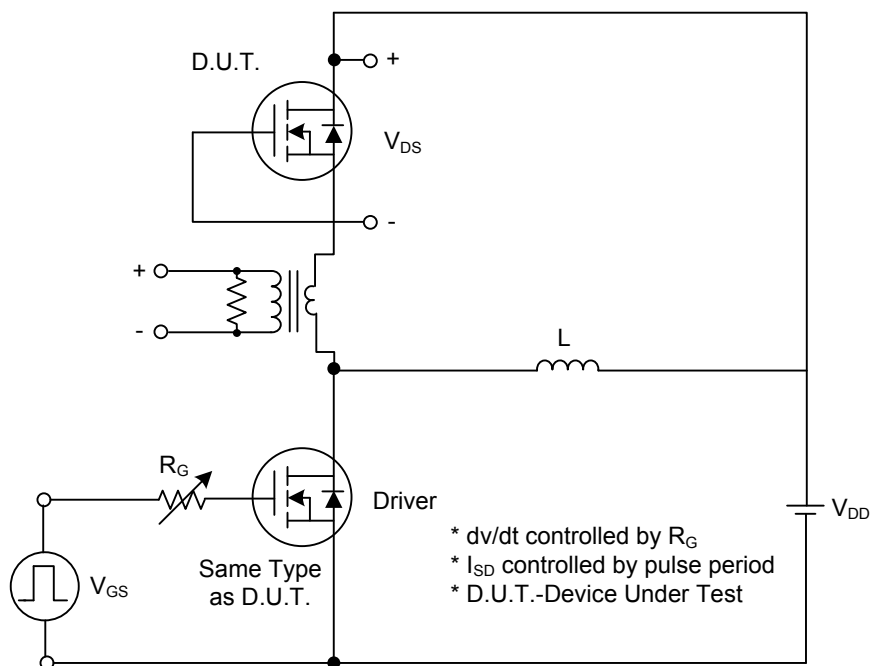
■ ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified.)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	650			V
Drain-Source Leakage Current		I_{DSS}	$V_{DS} = 650V, V_{GS} = 0V$			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
Breakdown Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	$I_D = 250\mu A$ referenced to 25°C		0.4		V/°C
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0		4.2	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 0.5A$		11	15	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1MHz$			100	pF
Output Capacitance		C_{OSS}				20	pF
Reverse Transfer Capacitance		C_{RSS}				3	pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	$V_{DD}=325V, I_D=0.5A, R_G=5\Omega$ (Note 1,2)		12	34	ns
Turn-On Rise Time		t_R			11	32	ns
Turn-Off Delay Time		$t_{D(OFF)}$			40	90	ns
Turn-Off Fall Time		t_F			18	46	ns
Total Gate Charge		Q_G	$V_{DS}=520V, V_{GS}=10V, I_D=0.8A$ (Note 1,2)		8	10	nC
Gate-Source Charge		Q_{GS}			1.8		nC
Gate-Drain Charge		Q_{GD}			4.0		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage		V_{SD}	$V_{GS}=0V, I_{SD} = 1.2A$			1.6	V
Maximum Continuous Drain-Source Diode Forward Current		I_S				1.2	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				4.8	A
Reverse Recovery Time		t_{RR}	$V_{GS}=0V, I_{SD} = 1.2A$		136		ns
Reverse Recovery Charge		Q_{RR}	$di/dt = 100A/\mu s$		0.3		μC

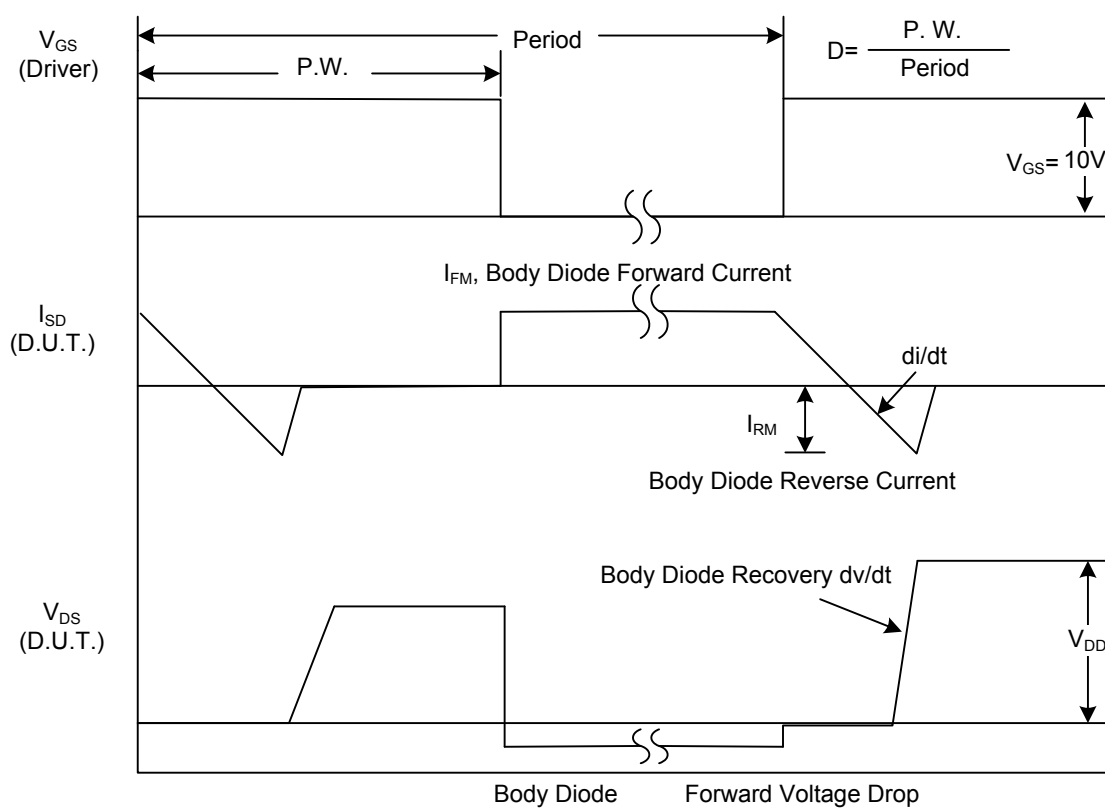
Notes: 1. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

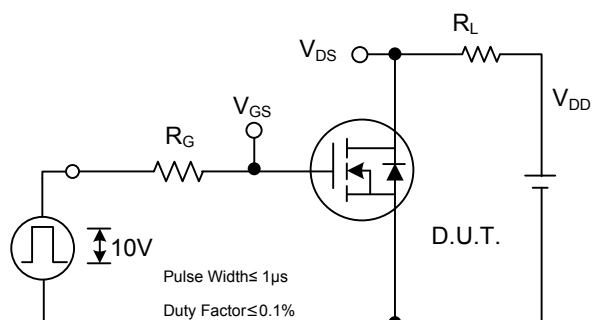


Peak Diode Recovery dv/dt Test Circuit

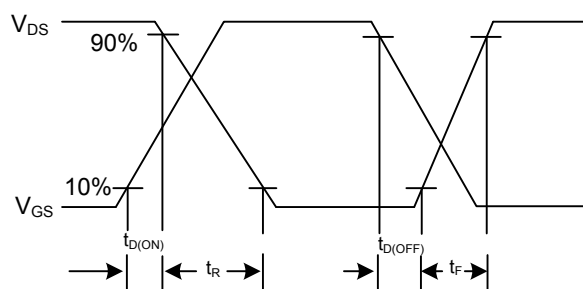


Peak Diode Recovery dv/dt Waveforms

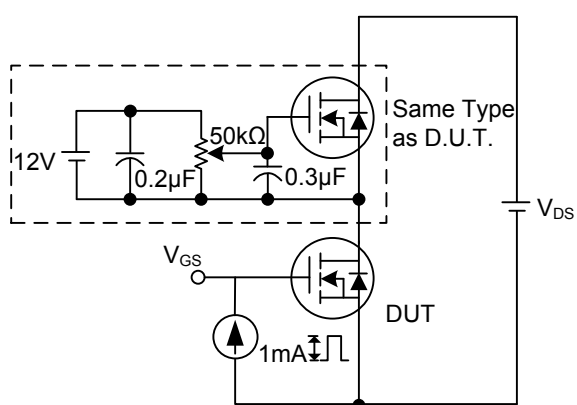
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



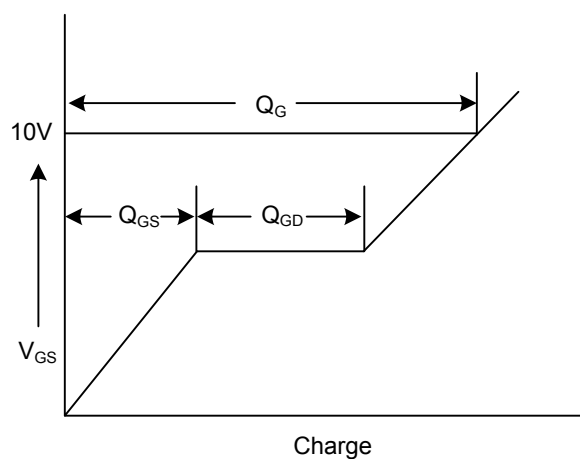
Switching Test Circuit



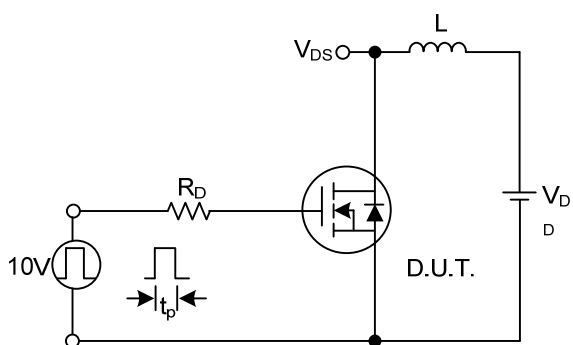
Switching Waveforms



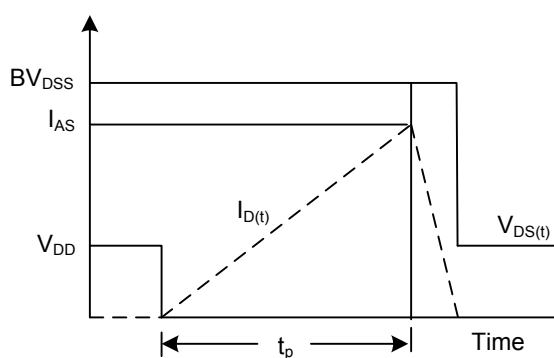
Gate Charge Test Circuit



Gate Charge Waveform

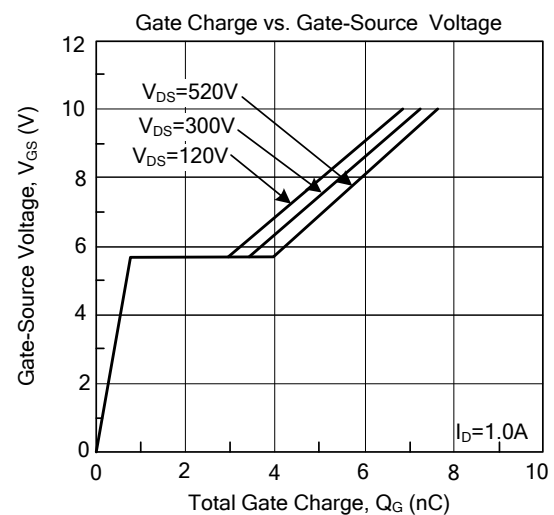
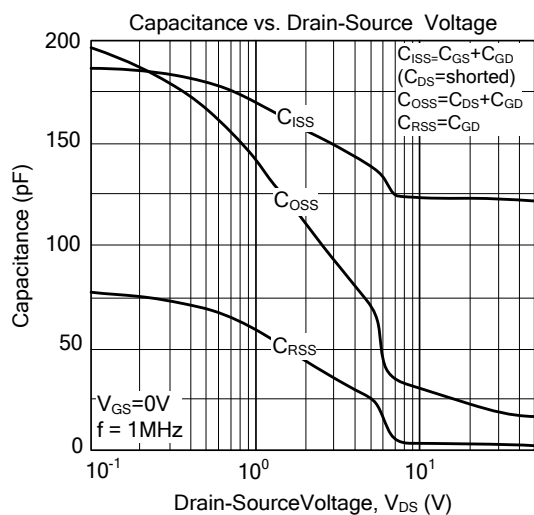
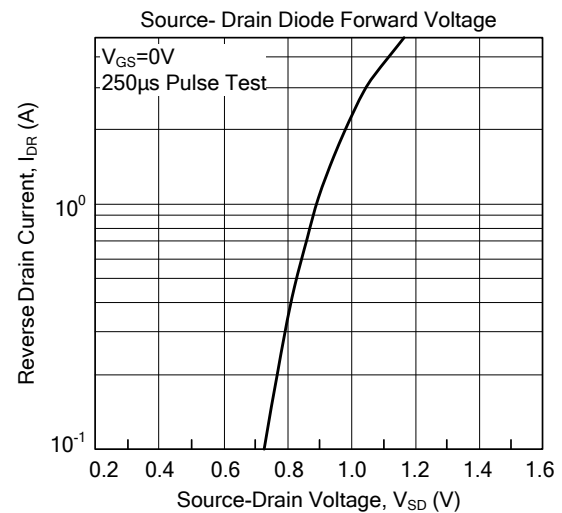
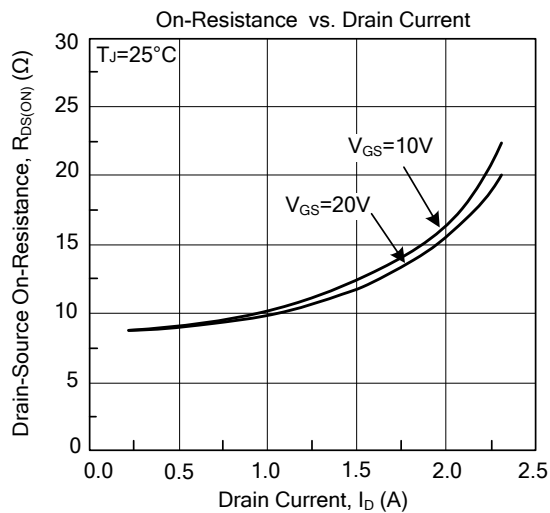
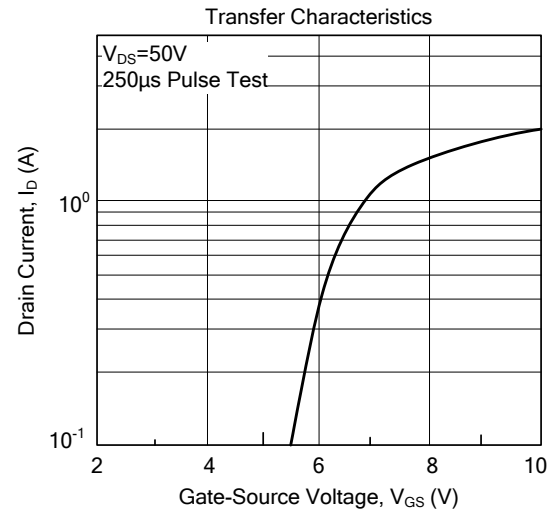
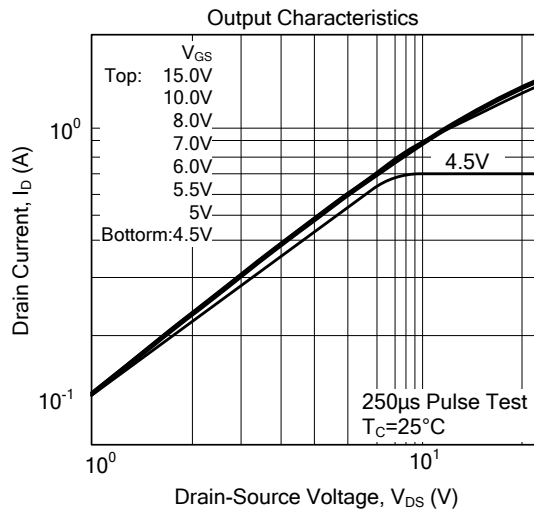


Unclamped Inductive Switching Test Circuit

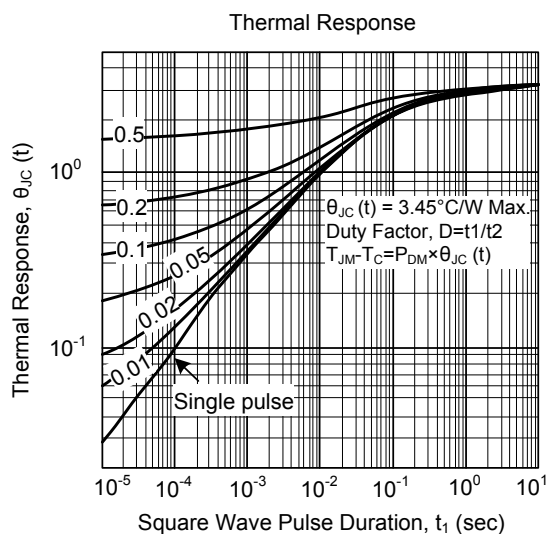
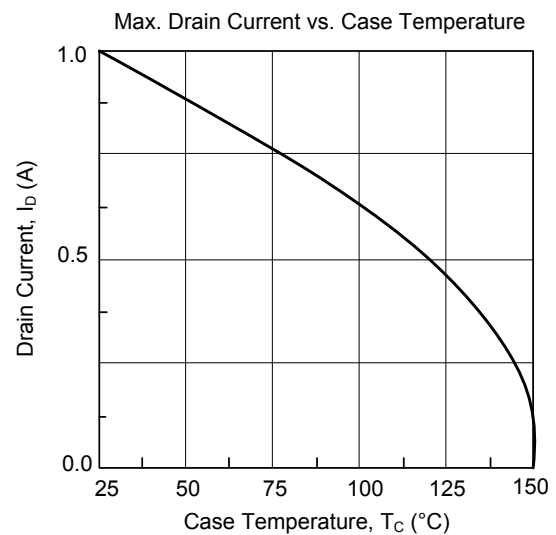
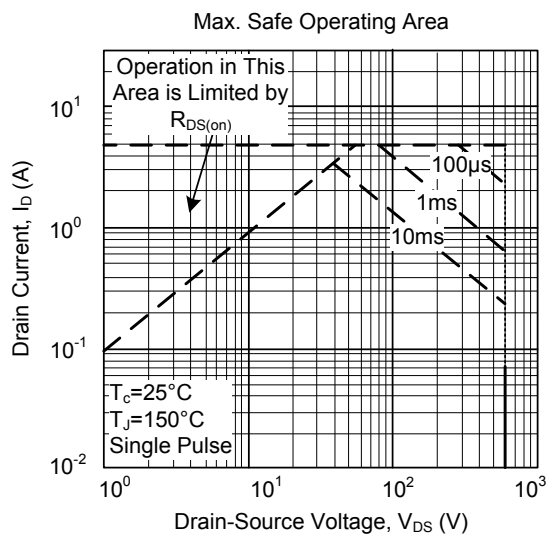
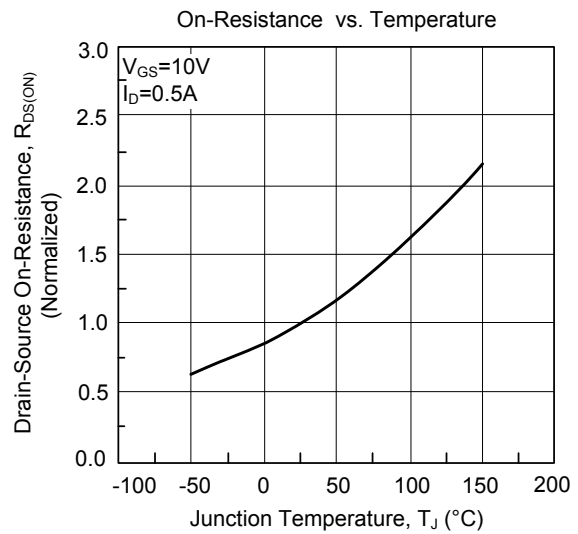
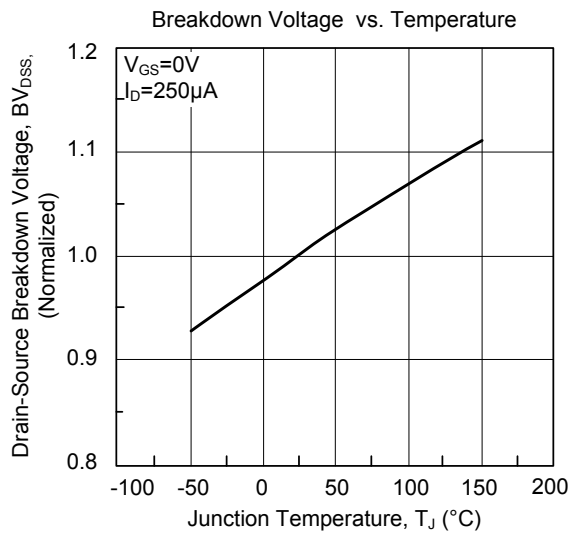


Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (Cont.)



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. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.