



USG12R072M-T

POWER MOSFET

60A, 120V N-CHANNEL POWER MOSFET

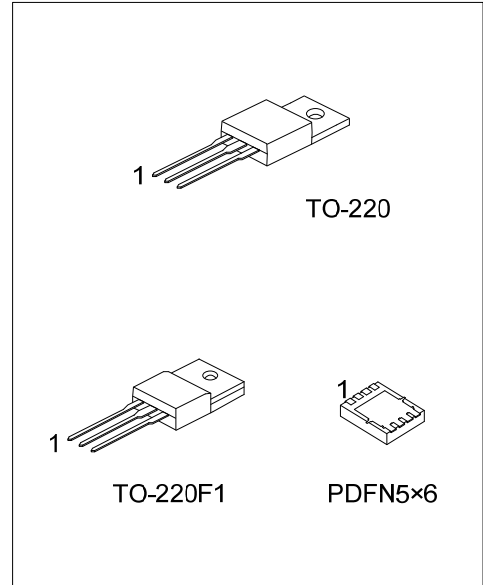
DESCRIPTION

The UTC **USG12R072M-T** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with low $R_{DS(ON)}$ characteristic by high cell density trench technology.

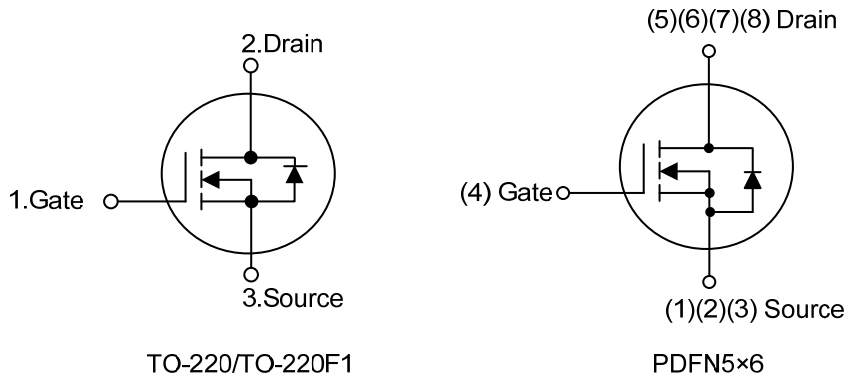
The UTC **USG12R072M-T** is suitable for high efficiency synchronous rectification in SMPS, UPS, hard switched and high frequency circuits.

FEATURES

- * $R_{DS(ON)} \leq 7.2 \text{ m}\Omega @ V_{GS}=10\text{V}, I_D=30\text{A}$
- $R_{DS(ON)} \leq 9.0 \text{ m}\Omega @ V_{GS}=4.5\text{V}, I_D=30\text{A}$
- * High Switching Speed



SYMBOL



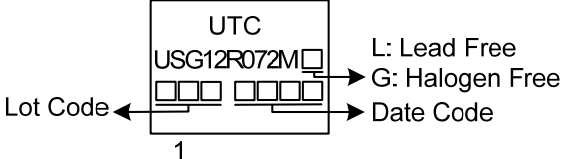
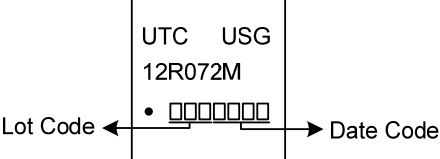
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
USG12R072ML-TA3-T	USG12R072MG-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
USG12R072ML-TF1-T	USG12R072MG-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
USG12R072ML-P5060-R	USG12R072MG-P5060-R	PDFN5x6	S	S	S	G	D	D	D	D	Tape Reel

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

<p>USG12R072MG-TA3-T</p> <ul style="list-style-type: none"> (1) Packing Type (2) Package Type (3) Green Package 	<ul style="list-style-type: none"> (1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, P5060: PDFN5x6 (3) G: Halogen Free and Lead Free, L: Lead Free
--	--

■ MARKING

TO-220 / TO-220F1	PDFN5x6
 <p>UTC USG12R072M □ □□□ □□□□ Lot Code ← → Date Code L: Lead Free G: Halogen Free 1</p>	 <p>UTC USG 12R072M • □□□□□□ Lot Code ← → Date Code</p>

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	120	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current	Continuous	I_D	60	A
	Pulsed (Note 2)	I_{DM}	240	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	180	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.8	V/ns
Power Dissipation	TO-220	P_D	135	W
	TO-220F1		45	
	PDFN5×6		60	W
Junction Temperature		T_J	+150	$^{\circ}\text{C}$
Storage Temperature Range		T_{STG}	-20 ~ +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. $L = 1\text{mH}$, $I_{AS} = 19\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD} \leq 50\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F1	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	PDFN5×6		65	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	0.92	$^{\circ}\text{C}/\text{W}$
	TO-220F1		2.77	$^{\circ}\text{C}/\text{W}$
	PDFN5×6		2.08 (Note)	$^{\circ}\text{C}/\text{W}$

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

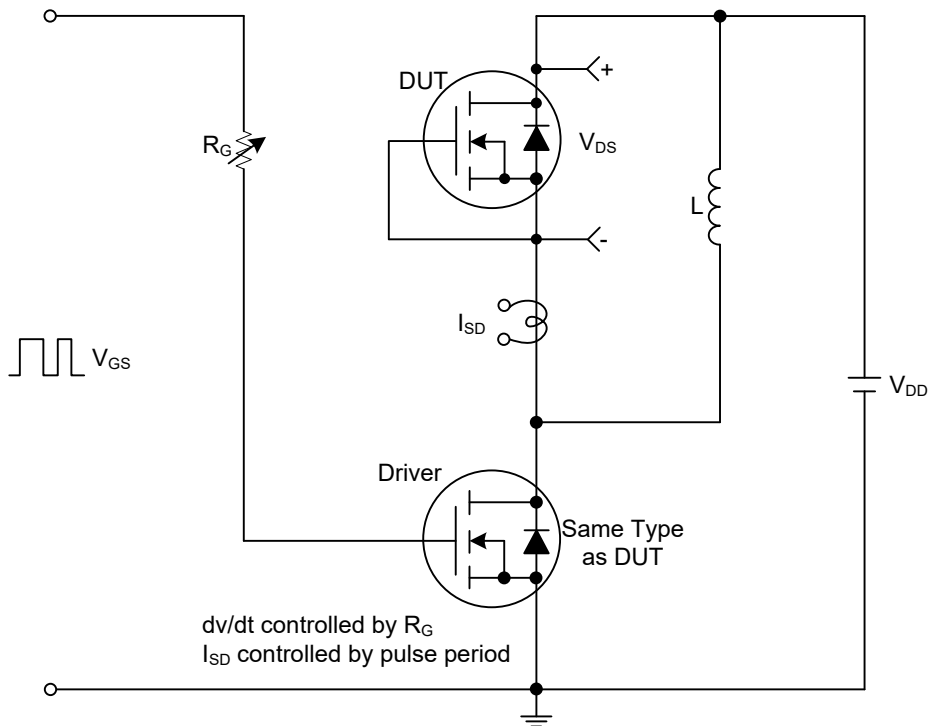
■ ELECTRICAL CHARACTERISTICS (T_J = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	120			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =80V, V _{GS} =0V			1	μA
Gate-Source Leakage Current	Forward	I _{GSS} V _{GS} =+20V, V _{DS} =0V V _{GS} =-20V, V _{DS} =0V			+100	nA
	Reverse				-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	1.5		2.5	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =30A		6.0	7.2	mΩ
		V _{GS} =4.5V, I _D =30A		7.2	9.0	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		4580		pF
Output Capacitance	C _{OSS}			2270		pF
Reverse Transfer Capacitance	C _{RSS}			92		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q _G	V _{DS} =96V, V _{GS} =10V, I _D =60A, (Note 1, 2)		110		nC
Gate to Source Charge	Q _{GS}			22		nC
Gate to Drain Charge	Q _{GD}			24		nC
Turn-on Delay Time (Note 1)	t _{D(ON)}	V _{DD} =60V, V _{GS} =10V, I _D =60A, R _G =3.3Ω (Note 1, 2)		16		ns
Rise Time	t _R			19		ns
Turn-off Delay Time	t _{D(OFF)}			52		ns
Fall-Time	t _F			22		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				60	A
Maximum Body-Diode Pulsed Current	I _{SM}				240	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =60A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)	t _{rr}	I _S =30A, V _{GS} =0V,		84		nS
Reverse Recovery Charge	Q _{rr}	dI _F /dt = 100A/μs		246		nC

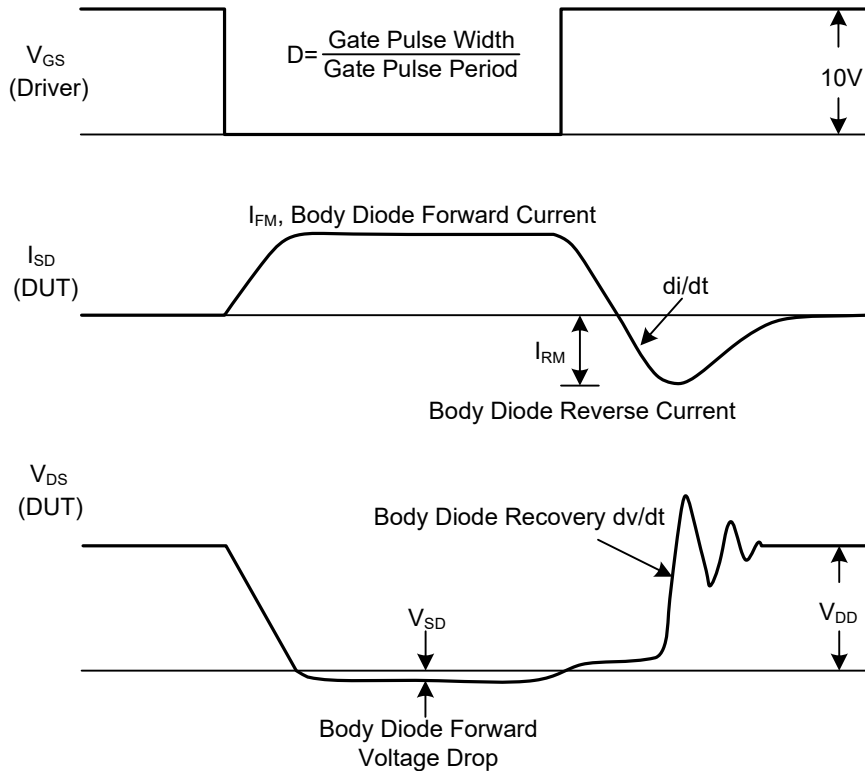
Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating ambient temperature.

TEST CIRCUITS AND WAVEFORMS



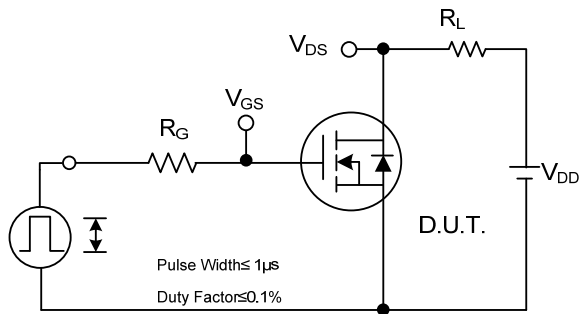
Peak Diode Recovery dv/dt Test Circuit



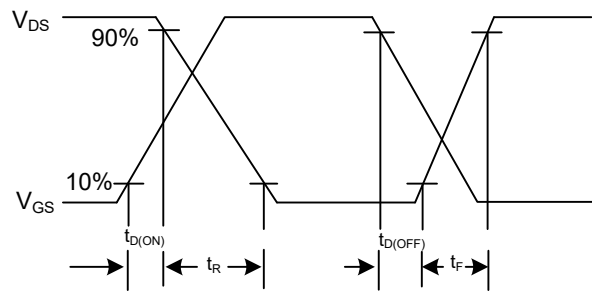
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

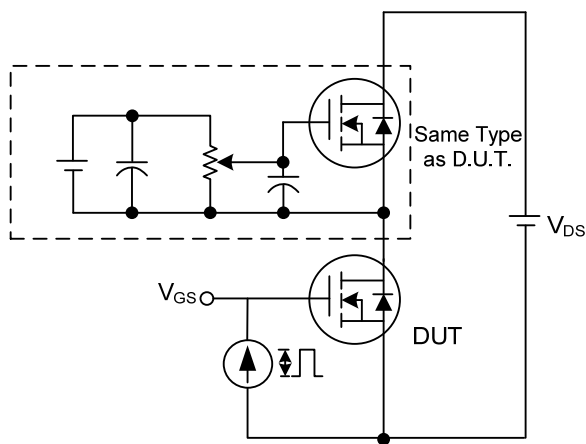
TEST CIRCUITS AND WAVEFORMS



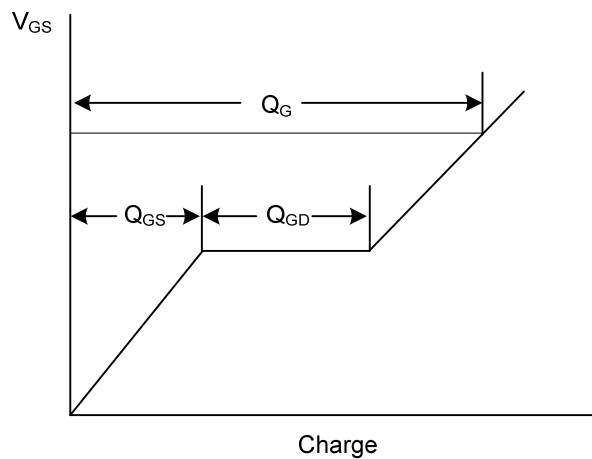
Switching Test Circuit



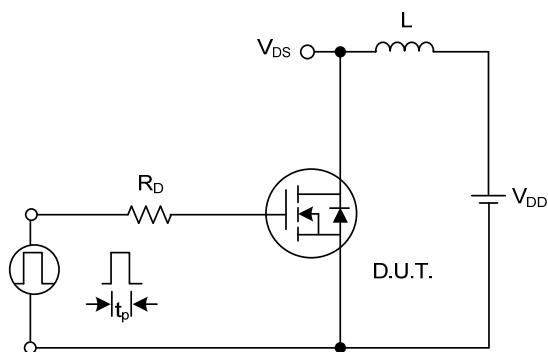
Switching Waveforms



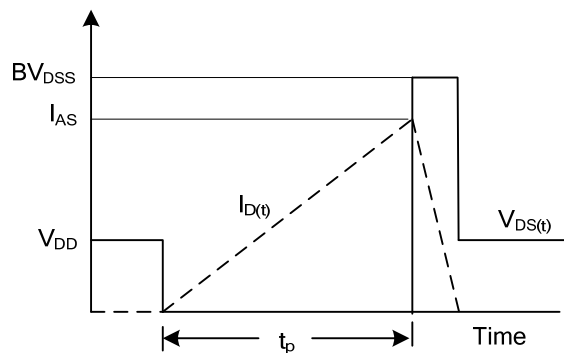
Gate Charge Test Circuit



Gate Charge Waveform

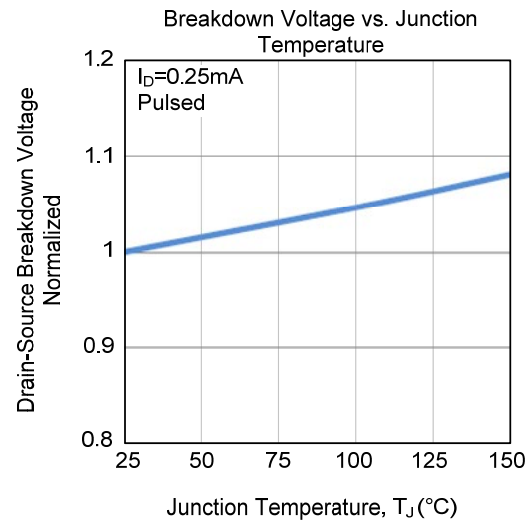
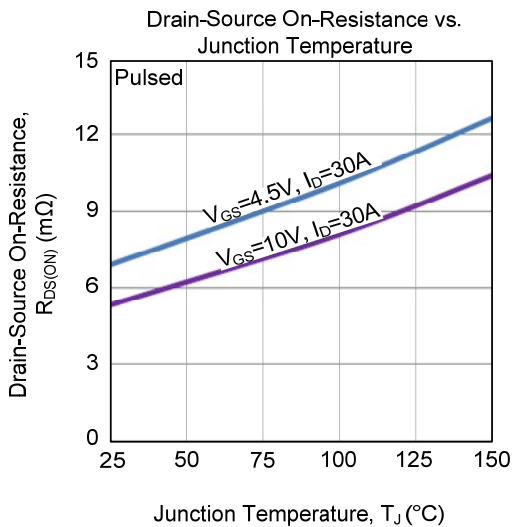
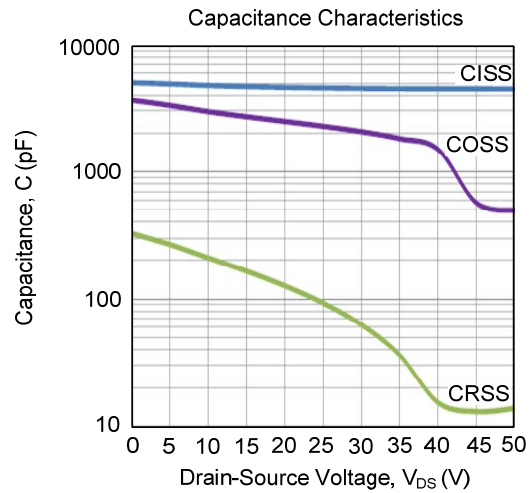
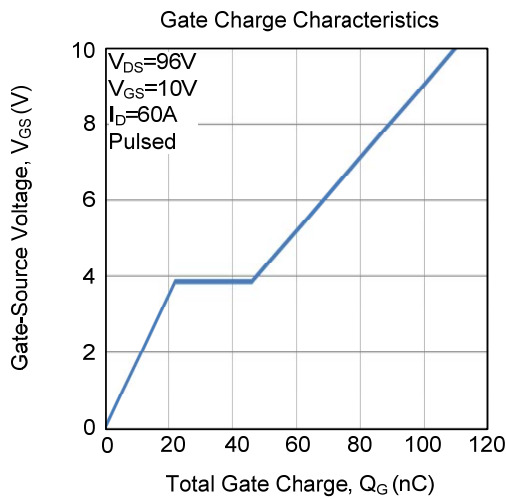
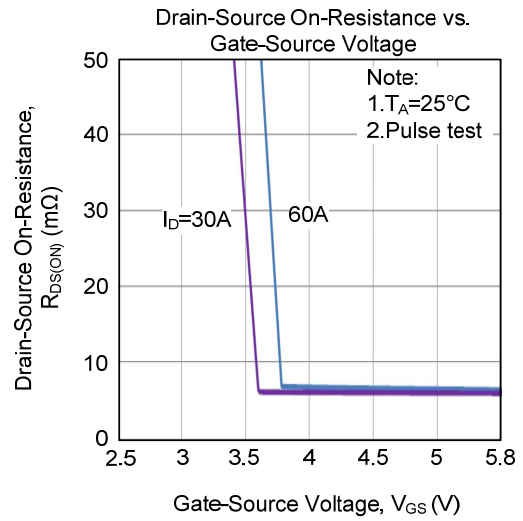
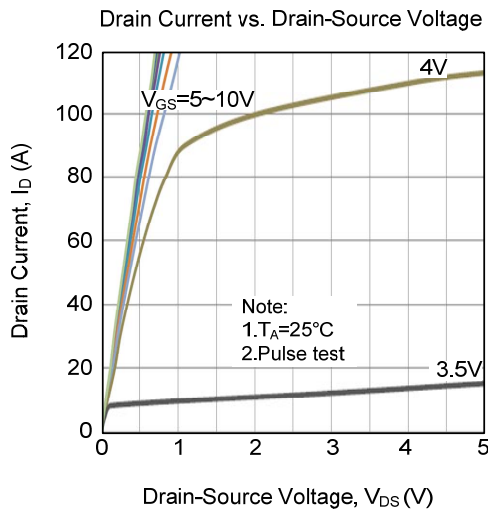


Unclamped Inductive Switching Test Circuit

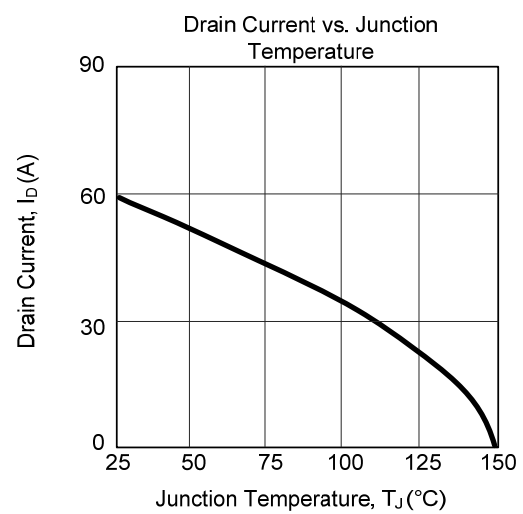
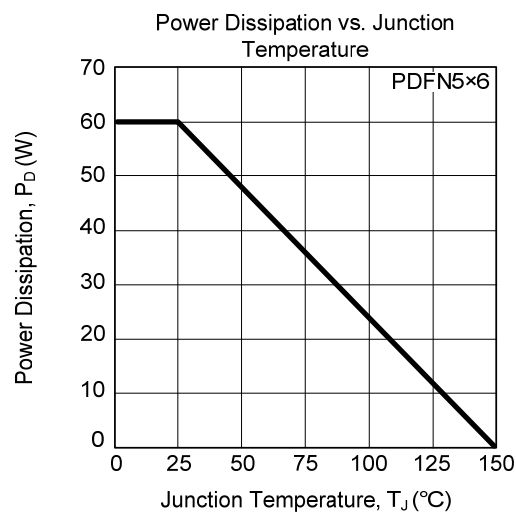
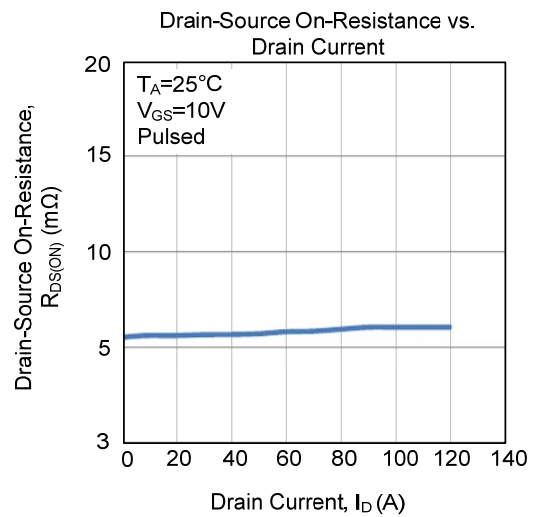
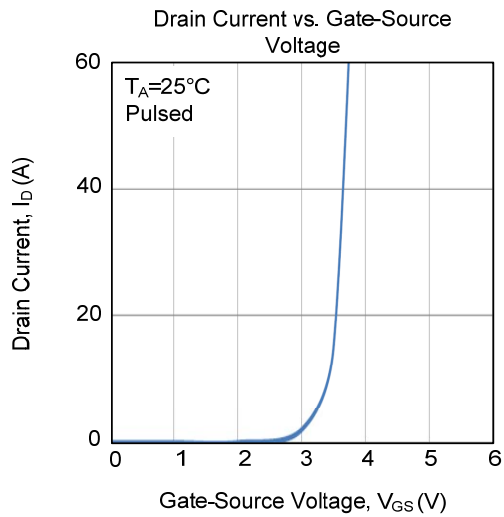
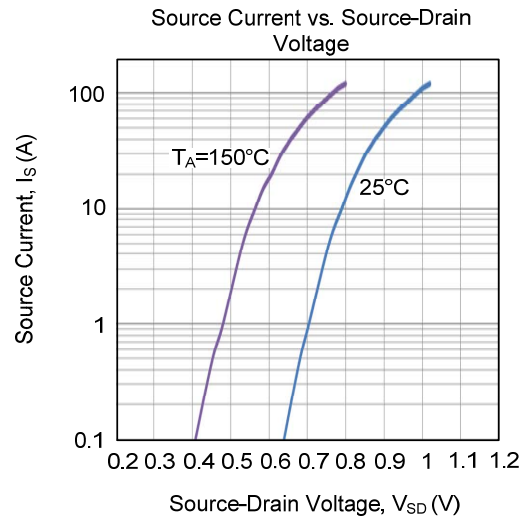
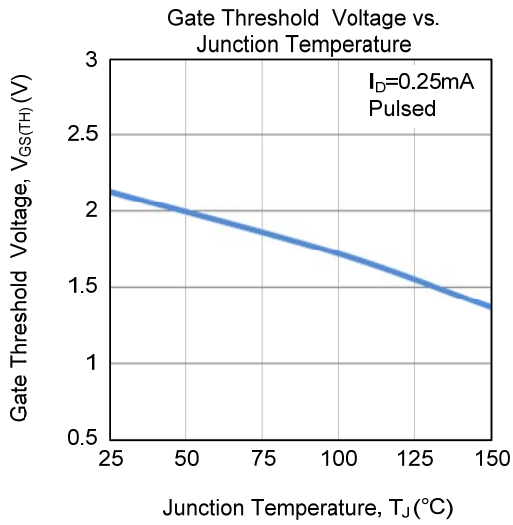


Unclamped Inductive Switching Waveforms

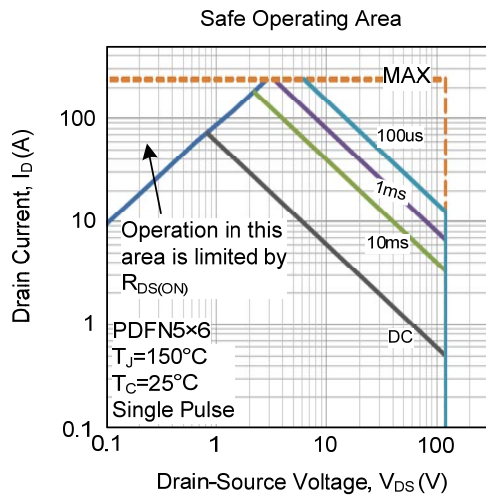
TYPICAL CHARACTERISTICS



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.