



## USG10R014H

Preliminary

Power MOSFET

### N-CHANNEL SGT ENHANCEMENT POWER MOSFET

#### DESCRIPTION

The UTC **USG10R014H** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with high switching speed and low gate charge, etc.

The UTC **USG10R014H** applies to primary side switch, synchronous rectifier, Motor Drives, etc.

#### FEATURES

##### \* TOLL-8A

$R_{DS(ON)} \leq 1.4 \text{ m}\Omega @ V_{GS}=10V, I_D=80A$

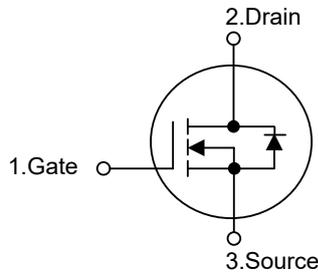
##### TO-247/TOLT-16A

$R_{DS(ON)}$  to be determined

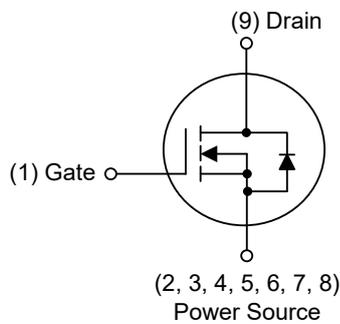
\* High Cell Density Trench Technology

\* High Power and Current Handling Capability

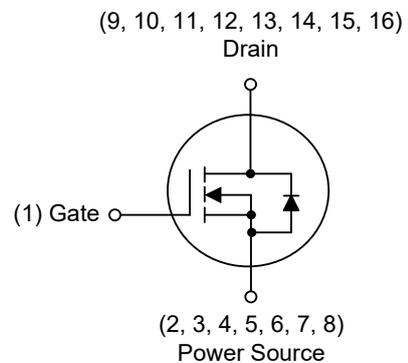
#### SYMBOL



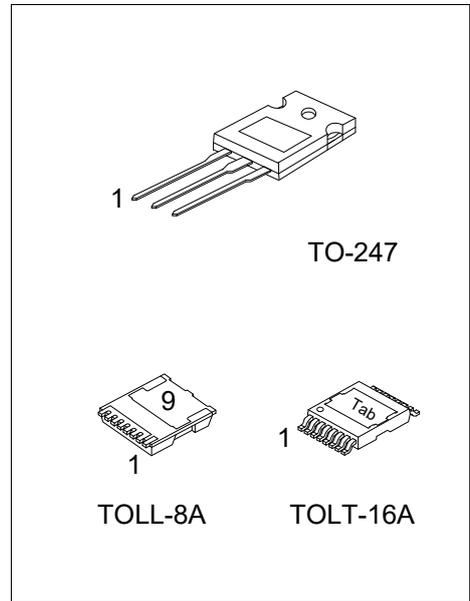
TO-247



TOLL-8A



TOLT-16A



### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment							Packing		
Lead Free	Halogen Free		1	2	3	4	5	6	7		8	9
USG10R014HL-T47-T	USG10R014HG-T47-T	TO-247	G	D	S	-	-	-	-	-	-	Tube
USG10R014HL-T8A-R	USG10R014HG-T8A-R	TOLL-8A	G	S	S	S	S	S	S	S	D	Tape Reel
USG10R014HL-TPA-R	USG10R014HG-TPA-R	TOLT-16A	refet to PIN CONFIGURATION							Tape Reel		

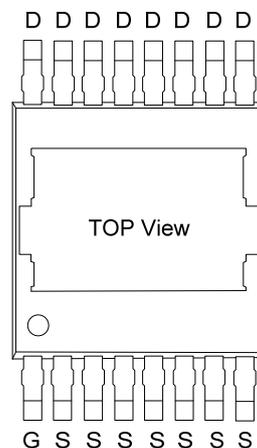
Note: Pin Assignment: G: Gate D: Drain S: Source

<p>USG10R014HG-T47-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) R: Tape Reel (2) T47: TO-247, P5060: PDFN5×6, TPA: TOLT-16A (3) G: Halogen Free and Lead Free, L: Lead Free</p>
--	--

### MARKING

TO-247	TOLL-8A
<p>UTC USG10R014H Lot Code 1 L: Lead Free G: Halogen Free Date Code</p>	<p>UTC USG10R014H Lot Code 1 L: Lead Free G: Halogen Free Date Code</p>
TOLT-16A	-
<p>UTC USG Tab (TOP View) 10R014H Lot Code 1 L: Lead Free G: Halogen Free Date Code</p>	-

### TOLT-16A PIN CONFIGURATION



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	100	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Drain Current	Continuous	$I_D$	300	A
	Pulsed (Note 2)	$I_{DM}$	600	A
Single Pulsed Avalanche Energy (Note 3)		$E_{AS}$	44	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.7	V/ns
Power Dissipation	TO-247	$P_D$	300	W
	TOLL-8A		500	W
	TOLT-16A		600	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.  $L = 0.1\text{mH}$ ,  $I_{AS} = 30\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$

4.  $I_{SD} \leq 30\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ ,  $T_J \leq T_{JMAX}$ ,  $T_J = 25^\circ\text{C}$ .

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-247	$\theta_{JA}$	50	$^\circ\text{C}/\text{W}$
	TOLL-8A		35	$^\circ\text{C}/\text{W}$
	TOLT-16A		45	$^\circ\text{C}/\text{W}$
Junction to Case	TO-247	$\theta_{JC}$	0.42	$^\circ\text{C}/\text{W}$
	TOLL-8A		0.25	$^\circ\text{C}/\text{W}$
	TOLT-16A		0.2	$^\circ\text{C}/\text{W}$

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

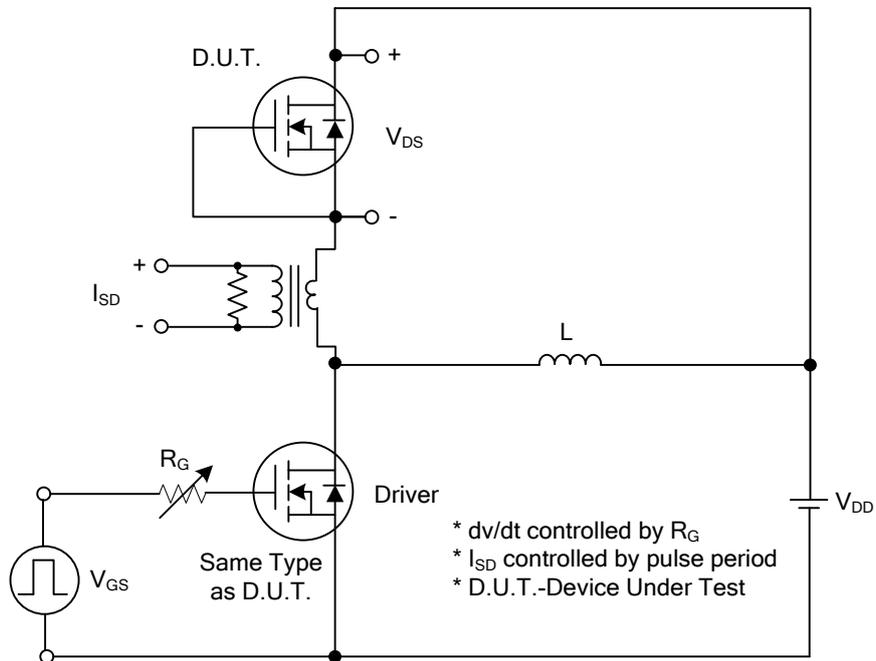
ELECTRICAL CHARACTERISTICS ( $T_J=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	100			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=100\text{V}$ , $V_{GS}=0\text{V}$			1	$\mu\text{A}$
Gate-Source Leakage Current	Forward	$V_{GS}=+20\text{V}$ , $V_{DS}=0\text{V}$			+100	nA
	Reverse	$V_{GS}=-20\text{V}$ , $V_{DS}=0\text{V}$			-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	2.0		4.0	V
Static Drain-Source On-State Resistance	TO-247	$R_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=80\text{A}$		TBD	$\text{m}\Omega$
	TOLL-8A		$V_{GS}=10\text{V}$ , $I_D=80\text{A}$		1.4	$\text{m}\Omega$
	TOLT-16A		$V_{GS}=10\text{V}$ , $I_D=80\text{A}$		TBD	$\text{m}\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=25\text{V}$ , $V_{GS}=0\text{V}$ , $f=1.0\text{MHz}$		14		nF
Output Capacitance	$C_{OSS}$			6626		pF
Reverse Transfer Capacitance	$C_{RSS}$			3670		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	$Q_G$	$V_{DS}=80\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=170\text{A}$		280		nC
Gate to Source Charge	$Q_{GS}$			82		nC
Gate to Drain Charge	$Q_{GD}$			96		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=50\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=170\text{A}$ , $R_G=3\Omega$		236		ns
Rise Time	$t_R$			224		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			396		ns
Fall-Time	$t_F$			192		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				300	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				600	A
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_F=170\text{A}$ , $V_{GS}=0\text{V}$			1.4	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_S=30\text{A}$ , $di/dt=100\text{A}/\mu\text{s}$		238		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$				953	

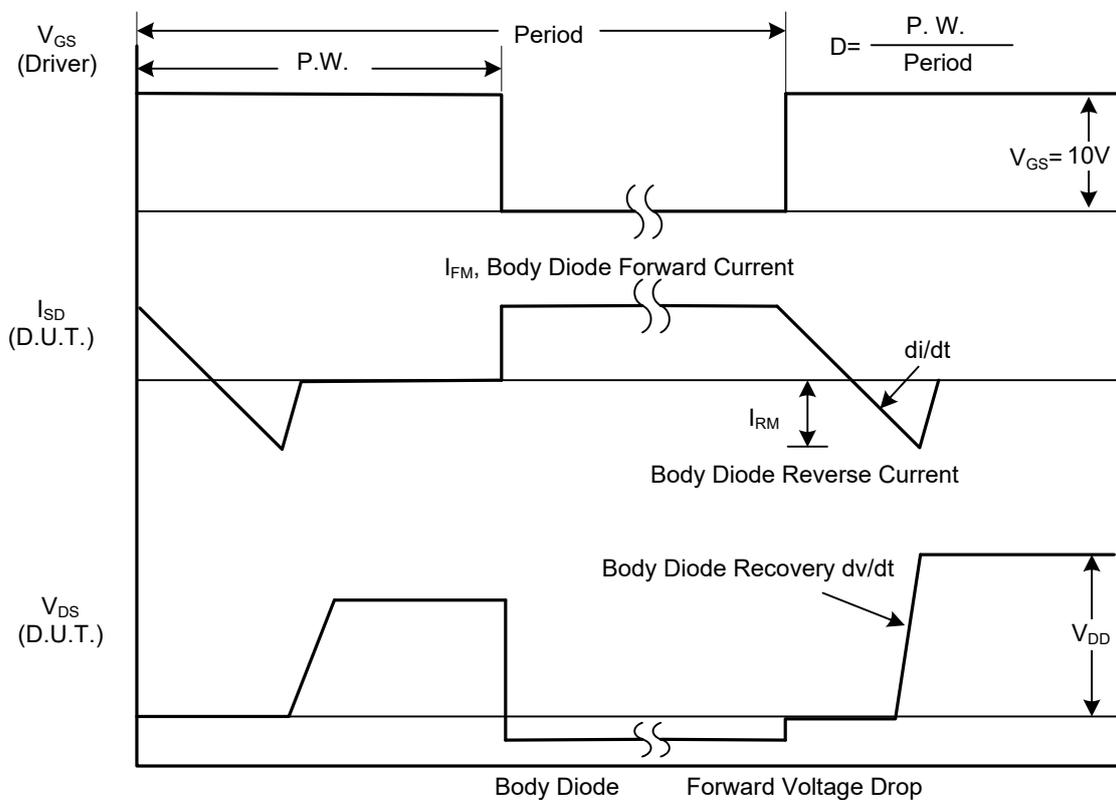
Notes: 1. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

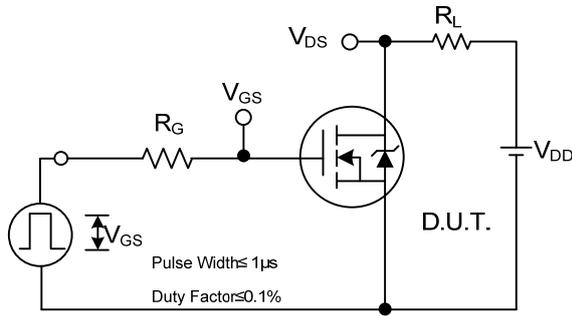


Peak Diode Recovery dv/dt Test Circuit

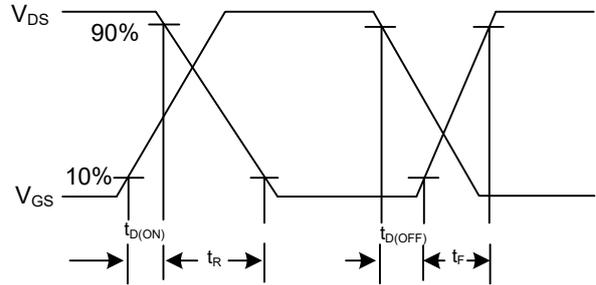


Peak Diode Recovery dv/dt Waveforms

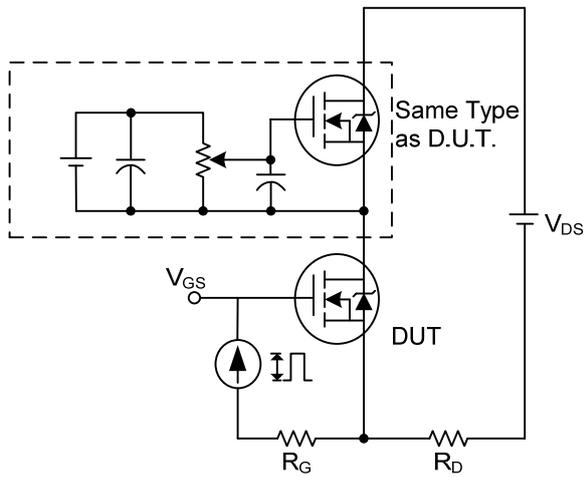
■ TEST CIRCUITS AND WAVEFORMS



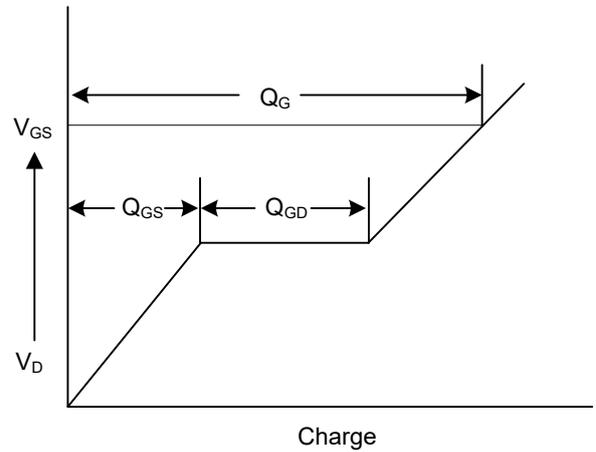
Switching Test Circuit



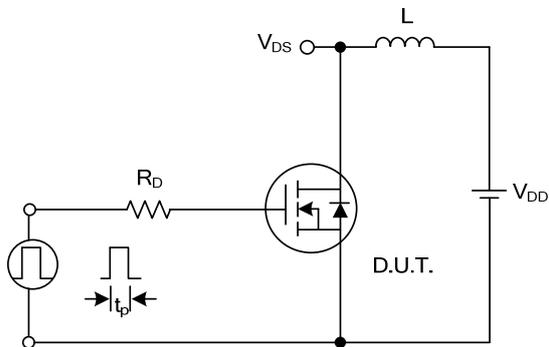
Switching Waveforms



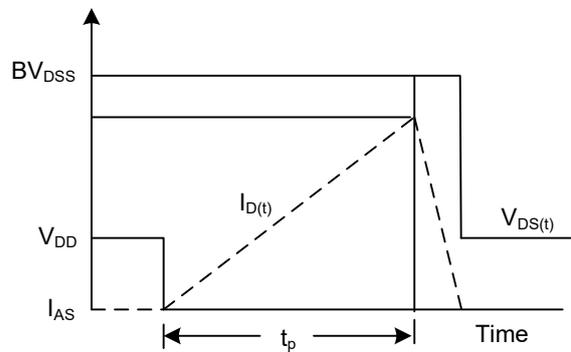
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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.