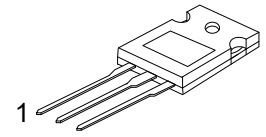
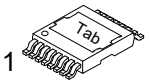
N-CHANNEL SGT ENHANCEMENT POWER MOSFET



TO-247

TOLL-8A



TOLT-16A

■ DESCRIPTION

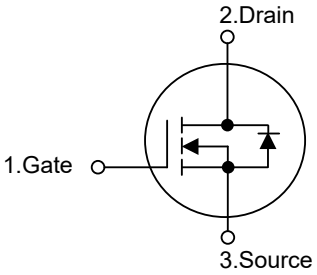
The UTC **USG10R014H** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with high switching speed and low gate charge, etc.

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

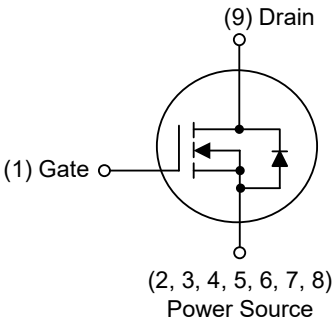
■ FEATURES

* **TOLL-8A**
  $R_{DS(ON)}$ ≤ 1.4 mΩ @ 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

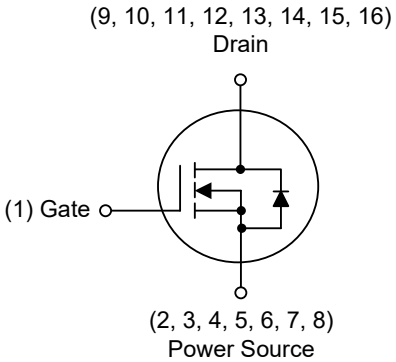
■ SYMBOL



TO-247



TOLL-8A



TOLT-16A

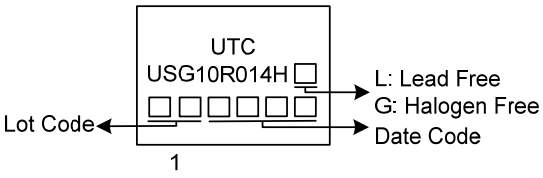
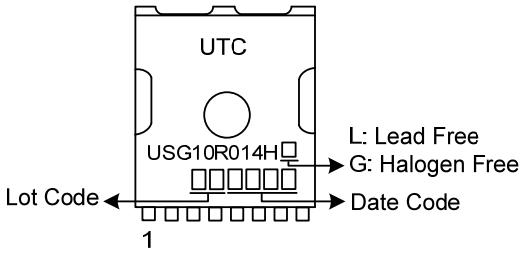
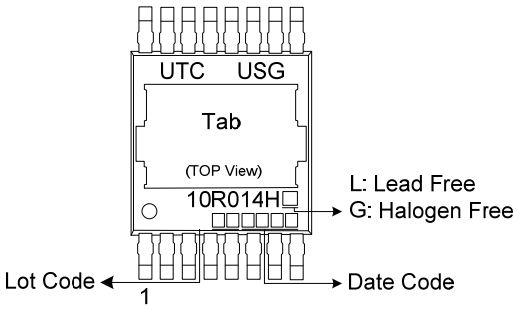
■ ORDERING INFORMATION

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

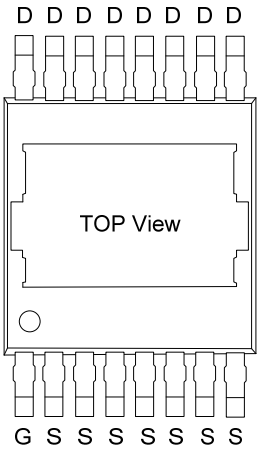
Note: Pin Assignment: G: Gate D: Drain S: Source

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

■ MARKING

TO-247	TOLL-8A
	
TOLT-16A	**-**
	-

■ TOLT-16A PIN CONFIGURATION



■ ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	100	V
Gate-Source Voltage		V_{GSS}	±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	°C
Storage Temperature		T_{STG}	-55 ~ +150	°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 = 0.1mH, I_{AS} = 30A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
4. I_{SD} ≤ 30A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, T_J ≤ T_{JMAX}, T_J = 25°C.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-247	θ_{JA}	50	°C/W
	TOLL-8A		35	°C/W
	TOLT-16A		45	°C/W
Junction to Case	TO-247	θ_{JC}	0.42	°C/W
	TOLL-8A		0.25	°C/W
	TOLT-16A		0.2	°C/W

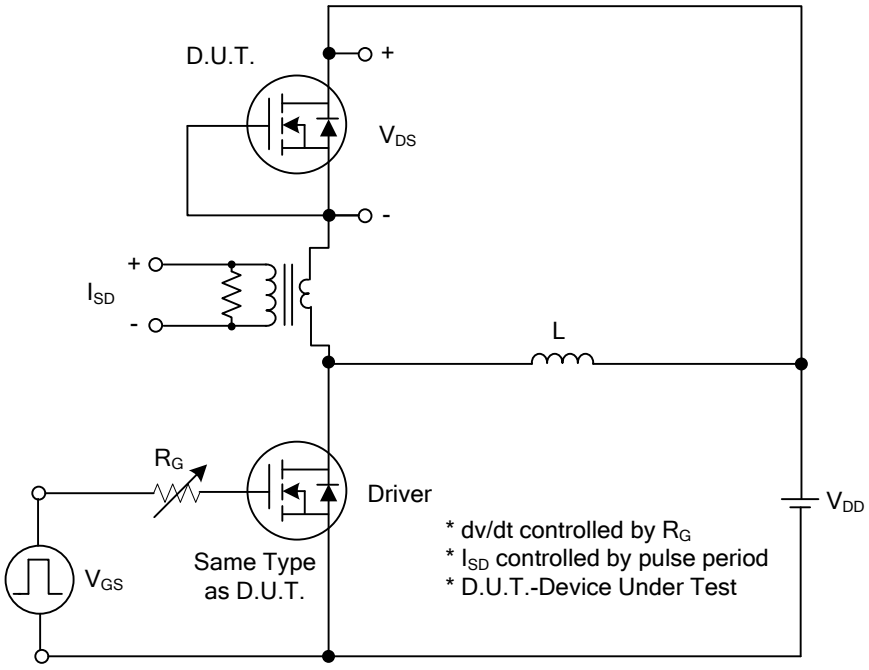
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

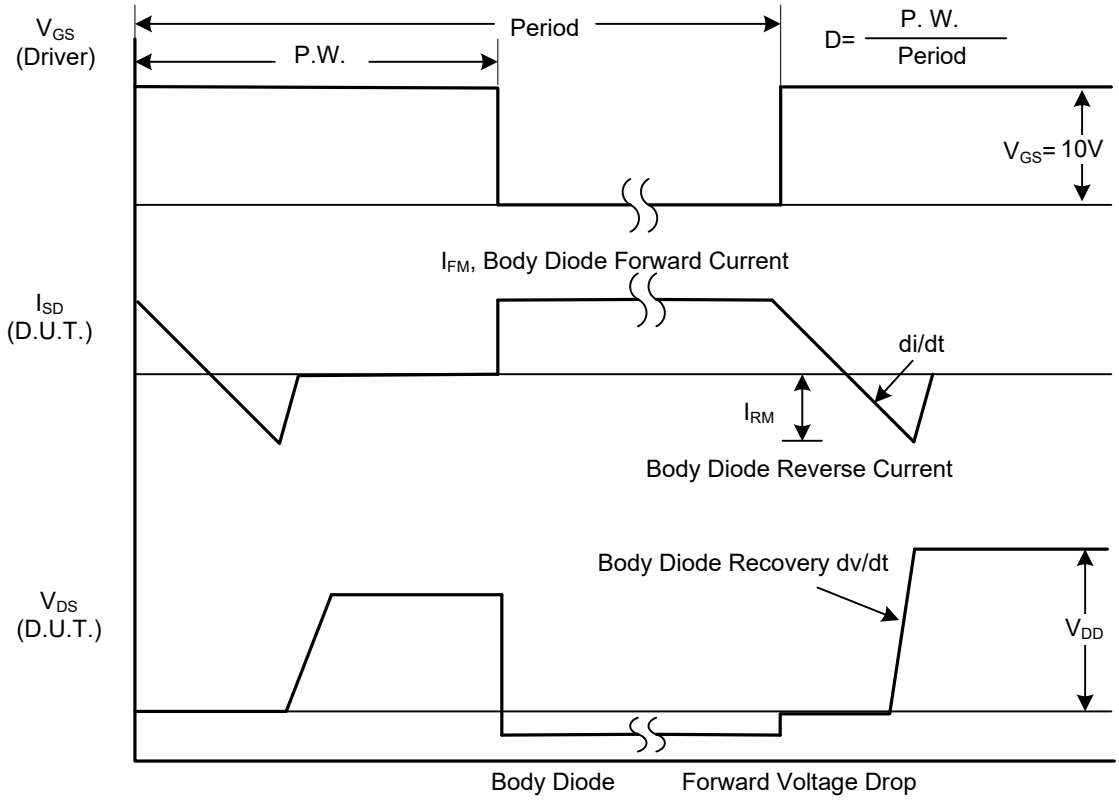
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	100			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=100V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse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

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

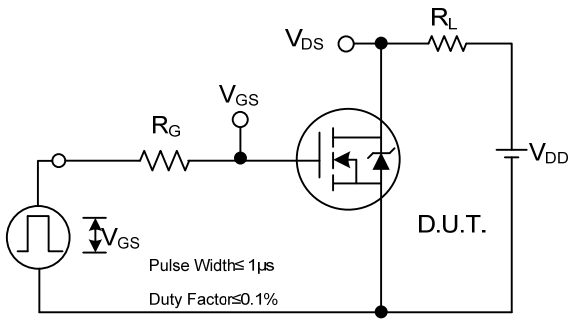


Peak Diode Recovery dv/dt Test Circuit

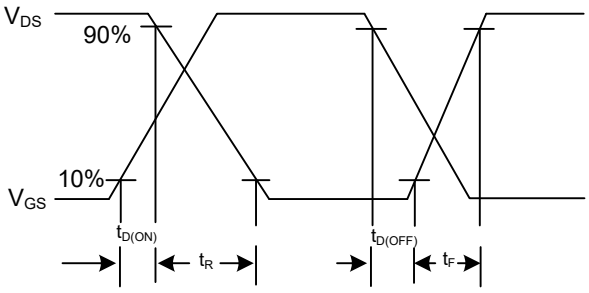


Peak Diode Recovery dv/dt Waveforms

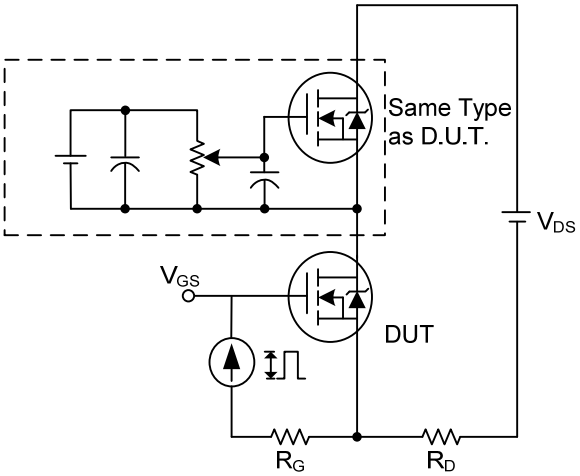
■ TEST CIRCUITS AND WAVEFORMS



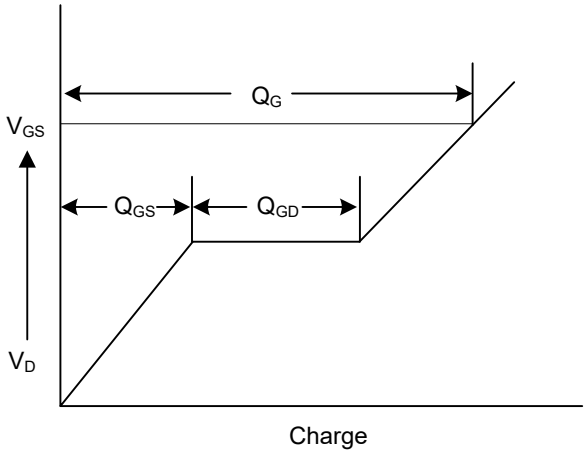
Switching Test Circuit



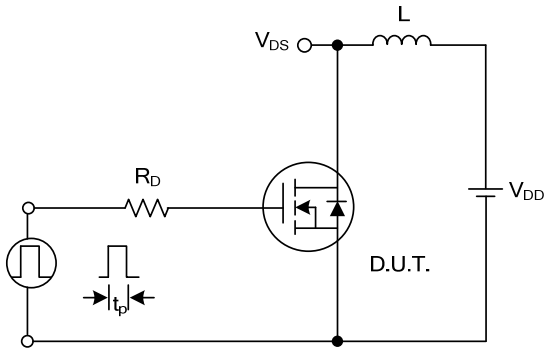
Switching Waveforms



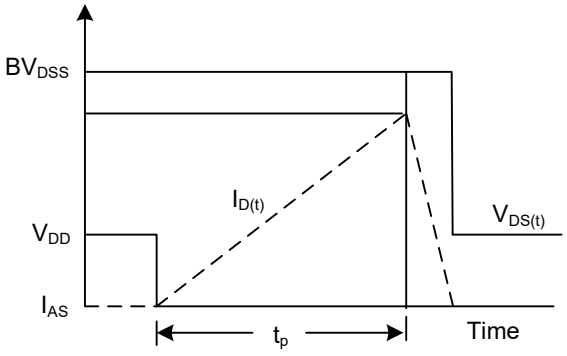
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms