



USG10R230H

Preliminary

Power MOSFET

**N-CHANNEL SGT
ENHANCEMENT POWER
MOSFET**

■ DESCRIPTION

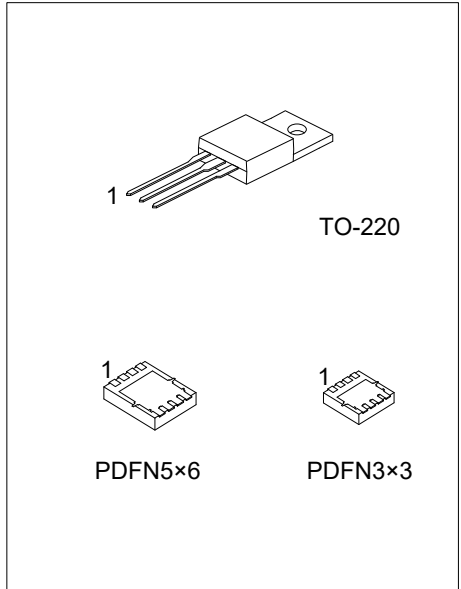
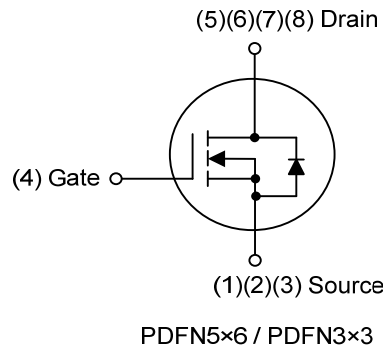
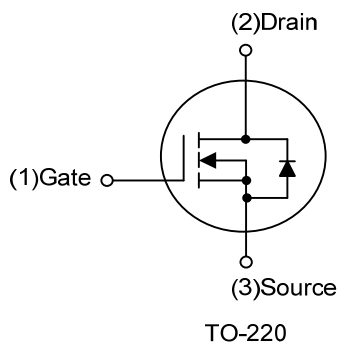
The UTC **USG10R230H** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with high switching speed and low gate charge, etc.

The UTC **USG10R230H** applies to primary side switch, synchronous rectifier, Motor Drives, etc.

■ FEATURES

- * $R_{DS(ON)} \leq 23 \text{ m}\Omega @ V_{GS}=10V, I_D=17A$
- * High Cell Density Trench Technology
- * High Power and Current Handling Capability

■ SYMBOL



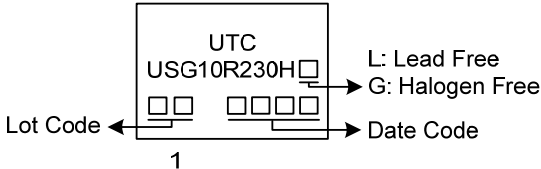
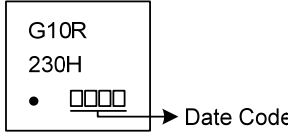
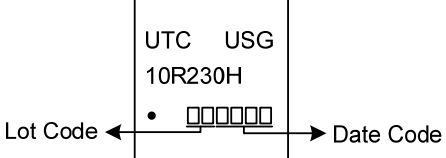
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment						Packing		
Lead Free	Halogen Free		1	2	3	4	5	6		7	8
USG10R230HL-TA3-T	USG10R230HG-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
USG10R230HL-P3030-R	USG10R230HG-P3030-R	PDFN3x3	S	S	S	G	D	D	D	D	Tape Reel
USG10R230HL-P5060-R	USG10R230HG-P5060-R	PDFN5x6	S	S	S	G	D	D	D	D	Tape Reel

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

<p>USG10R230HG-TA3-T</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, P3030: PDFN3x3 P5060: PDFN5x6 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING

PACKAGE	MARKING
TO-220	 <p>UTC USG10R230H</p> <p>Lot Code ← [] [] → Date Code</p> <p>L: Lead Free G: Halogen Free</p> <p>1</p>
PDFN3×3	 <p>G10R 230H</p> <p>• [] [] [] → Date Code</p>
PDFN5×6	 <p>UTC USG 10R230H</p> <p>Lot Code ← [] [] [] [] [] → Date Code</p>

■ 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}	± 20	V
Drain Current	Continuous	I_D	35	A
	Pulsed (Note 2)	I_{DM}	70	A
Power Dissipation	TO-220	P_D	55	W
	PDFN3×3		20	W
	PDFN5×6		25	W
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	1	mJ
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. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

3. $L = 0.1\text{mH}$, $I_{AS} = 4.5\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	$^\circ\text{C/W}$
	PDFN3×3		130	$^\circ\text{C/W}$
	PDFN5×6		65	$^\circ\text{C/W}$
Junction to Case (Note)	TO-220	θ_{JC}	2.27	$^\circ\text{C/W}$
	PDFN3×3		6.25	$^\circ\text{C/W}$
	PDFN5×6		5	$^\circ\text{C/W}$

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

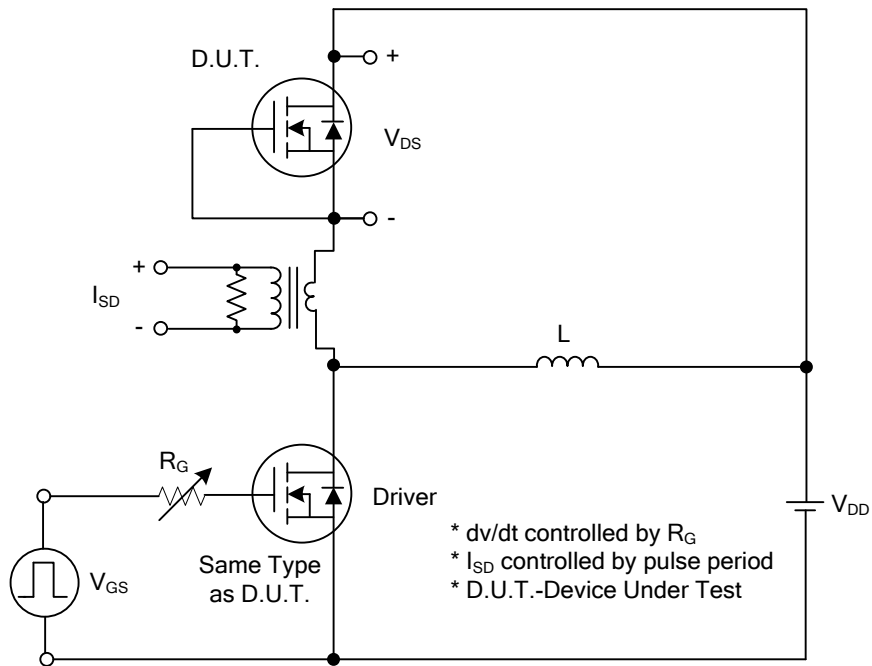
■ ELECTRICAL CHARACTERISTICS ($T_J=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
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	μA
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
ON CHARACTERISTICS						
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	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=17\text{A}$			23	$\text{m}\Omega$
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{DS}=25\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$		758		pF
Output Capacitance	C_{OSS}			413		pF
Reverse Transfer Capacitance	C_{RSS}			52		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{DS}=80\text{V}$, $V_{GS}=10\text{V}$, $I_D=17.5\text{A}$		22		nC
Gate to Source Charge	Q_{GS}			5		nC
Gate to Drain Charge	Q_{GD}			7		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=50\text{V}$, $V_{GS}=10\text{V}$, $I_D=17.5\text{A}$, $R_G=3\Omega$		4		ns
Rise Time	t_R			22		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			38		ns
Fall-Time	t_F			25		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				35	A
Maximum Body-Diode Pulsed Current	I_{SM}				70	A
Drain-Source Diode Forward Voltage	V_{SD}	$I_{SD}=35\text{A}$			1.4	V

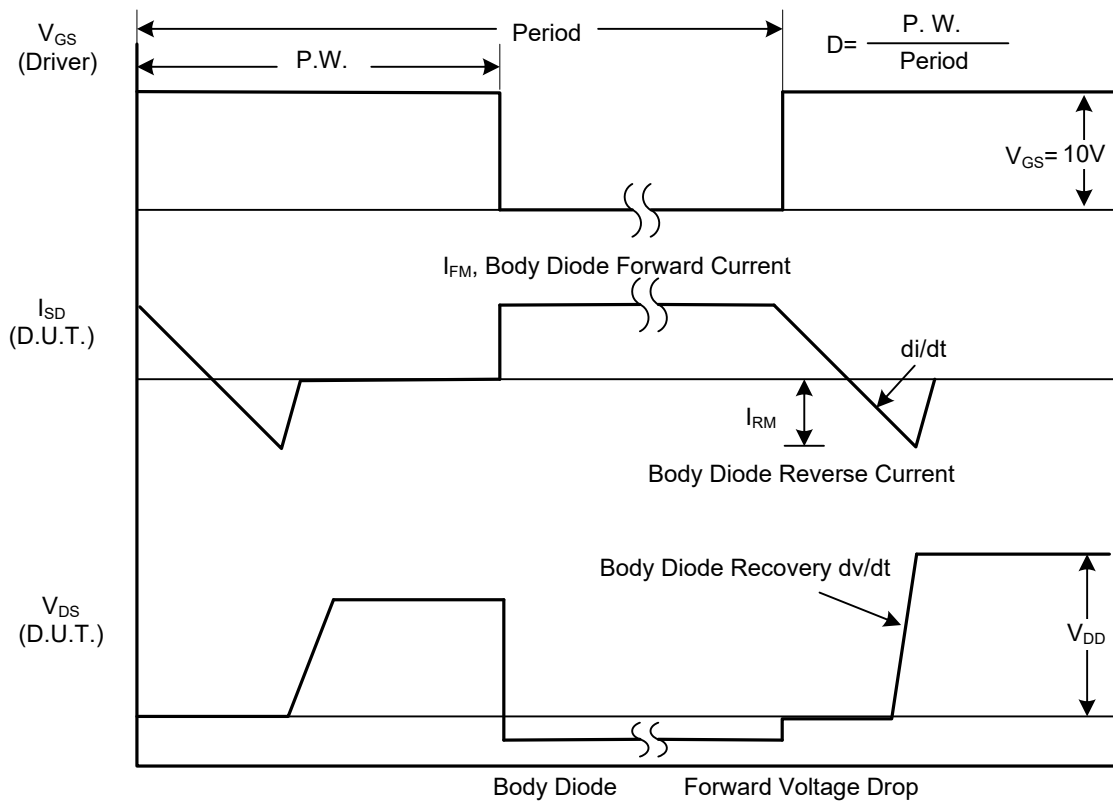
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

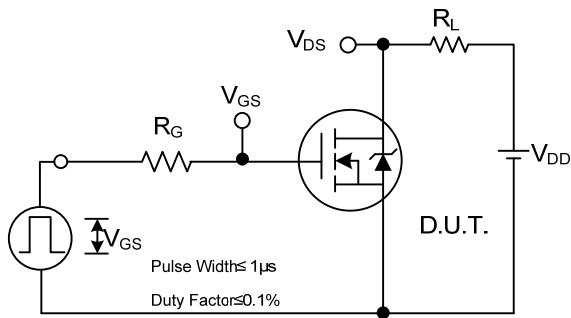


Peak Diode Recovery dv/dt Test Circuit

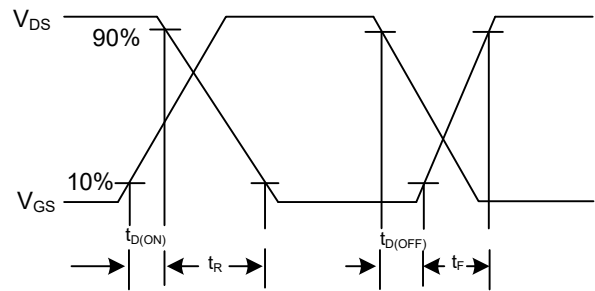


Peak Diode Recovery dv/dt Waveforms

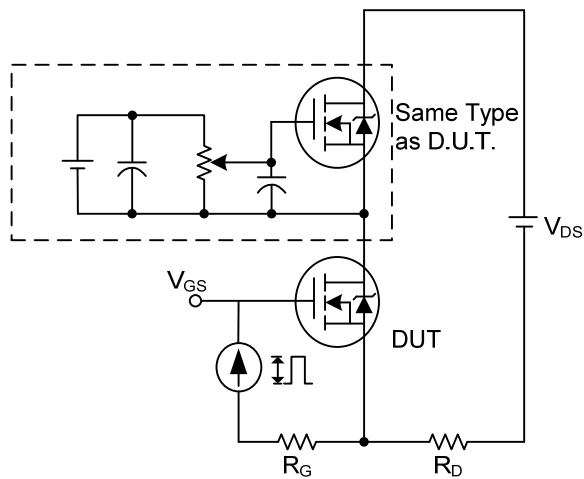
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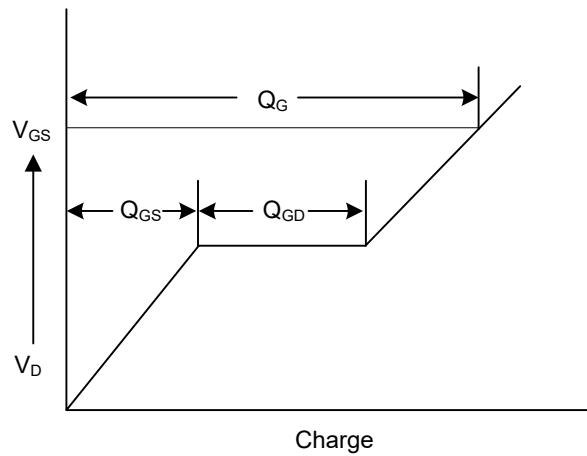
Switching Test Circuit



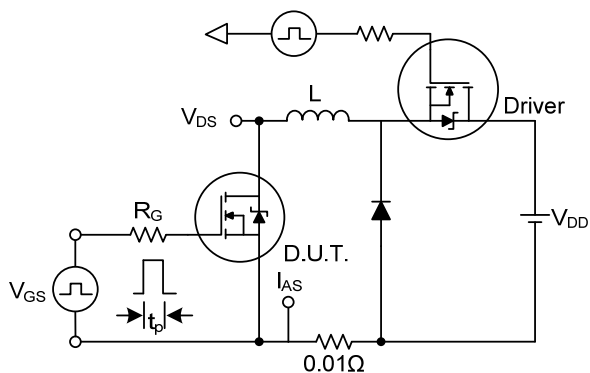
Switching Waveforms



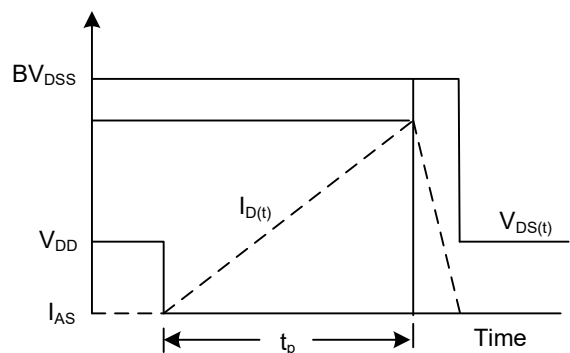
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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