



USG10R072H

Preliminary

Power MOSFET

N-CHANNEL SGT ENHANCEMENT POWER MOSFET

DESCRIPTION

The UTC **USG10R072H** 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 **USG10R072H** applies to primary side switch, synchronous rectifier, Motor Drives, etc.

FEATURES

* TO-220/TO-220F1/TO-220F2/TO-262/TO-263

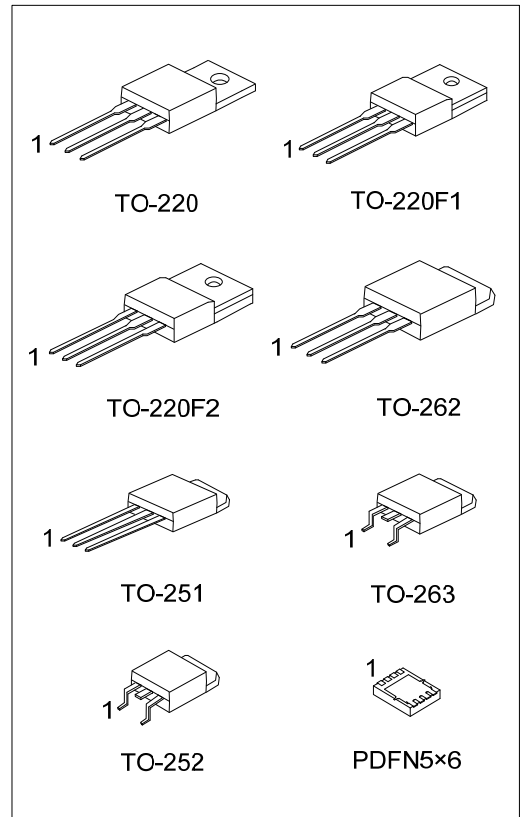
$R_{DS(ON)} \leq 8.0 \text{ m}\Omega @ V_{GS}=10\text{V}, I_D=40\text{A}$

* TO-251/TO-252/PDFN5x6

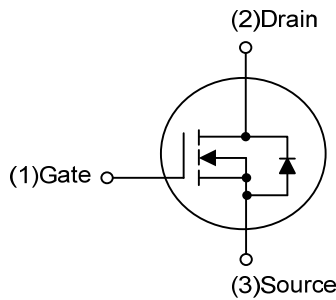
$R_{DS(ON)} \leq 7.2 \text{ m}\Omega @ V_{GS}=10\text{V}, I_D=40\text{A}$

* High Cell Density Trench Technology

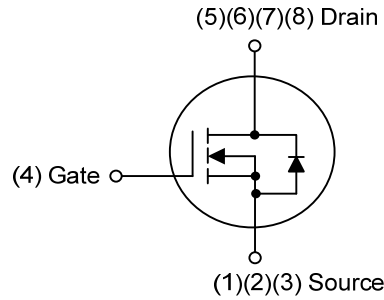
* High Power and Current Handling Capability



SYMBOL



TO-220/TO-220F1/TO-220F2
TO-251/TO-252/TO-262/TO-263



PDFN5x6

ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
USG10R072HL-TA3-T	USG10R072HG-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
USG10R072HL-TF1-T	USG10R072HG-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
USG10R072HL-TF2-T	USG10R072HG-TF2-T	TO-220F2	G	D	S	-	-	-	-	-	Tube
USG10R072HL-TM3-T	USG10R072HG-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
USG10R072HL-TN3-R	USG10R072HG-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
USG10R072HL-T2Q-T	USG10R072HG-T2Q-T	TO-262	G	D	S	-	-	-	-	-	Tube
USG10R072HL-TQ2-T	USG10R072HG-TQ2-T	TO-263	G	D	S	-	-	-	-	-	Tube
USG10R072HL-TQ2-R	USG10R072HG-TQ2-R	TO-263	G	D	S	-	-	-	-	-	Tape Reel
USG10R072HL-P5060-R	USG10R072HG-P5060-R	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

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

<p>USG10R072HG-TA3-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2 TM3: TO-251, TN3: TO-252, T2Q: TO-262, TQ2: TO-263, P5060: PDFN5×6 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING

TO-220 / TO-220F1 / TO-220F2 TO-251 / TO-252 / TO-262 / TO-263	PDFN5×6
<p>UTC USG10R072H</p> <p>Lot Code ← [] [] [] [] → Date Code</p> <p>Legend: L: Lead Free, G: Halogen Free</p>	<p>UTC USG 10R072H</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	90	A
	Pulsed (Note 2)	I_{DM}	180	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	1.5	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.6	V/ns
Power Dissipation	TO-220/TO-262/TO-263	P_D	112	W
	TO-220F1/TO-220F2		36	W
	TO-251/TO-252		58	W
	PDFN5×6		50	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. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

3. $L = 0.1\text{mH}$, $I_{AS} = 5.5\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, 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-220 TO-262/TO-263	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-220F1/TO-220F2			$^\circ\text{C}/\text{W}$
	TO-251/TO-252		110	$^\circ\text{C}/\text{W}$
	PDFN5×6		65 (Note)	$^\circ\text{C}/\text{W}$
Junction to Case (Note)	TO-220/TO-262/TO-263	θ_{JC}	1.12	$^\circ\text{C}/\text{W}$
	TO-220F1/TO-220F2		3.47	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		2.16 (Note)	$^\circ\text{C}/\text{W}$
	PDFN5×6		2.5 (Note)	$^\circ\text{C}/\text{W}$

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

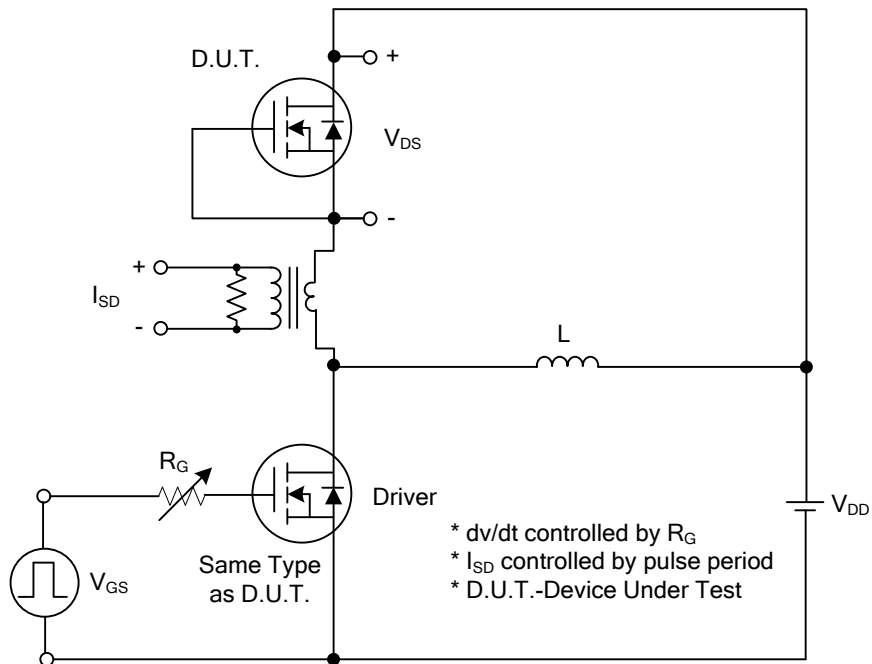
ELECTRICAL CHARACTERISTICS ($T_J=25^\circ\text{C}$, unless otherwise specified)

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	I_{GSS}	$V_{GS}=+20\text{V}$, $V_{DS}=0\text{V}$			+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	TO-220 TO-220F1 TO-220F2 TO-262 TO-263	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=40\text{A}$			8.0	m Ω
	TO-252 TO-251 PDFN5x6		$V_{GS}=10\text{V}$, $I_D=40\text{A}$			7.2	m Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	$V_{DS}=25\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$		2546		pF
Output Capacitance		C_{OSS}			1327		pF
Reverse Transfer Capacitance		C_{RSS}			166		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	$V_{DS}=80\text{V}$, $V_{GS}=10\text{V}$, $I_D=90\text{A}$		60		nC
Gate to Source Charge		Q_{GS}			13		nC
Gate to Drain Charge		Q_{GD}			24		nC
Turn-ON Delay Time		$t_{D(ON)}$	$V_{DD}=50\text{V}$, $V_{GS}=10\text{V}$, $I_D=90\text{A}$, $R_G=3.0\Omega$		12		ns
Rise Time		t_R			21		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			32		ns
Fall-Time		t_F			21		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				90	A
Maximum Body-Diode Pulsed Current		I_{SM}				180	A
Drain-Source Diode Forward Voltage		V_{SD}	$I_{SD}=100\text{A}$			1.4	V
Body Diode Reverse Recovery Time		t_{rr}	$I_S=30\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		53		ns
Body Diode Reverse Recovery Charge		Q_{rr}			93		nC

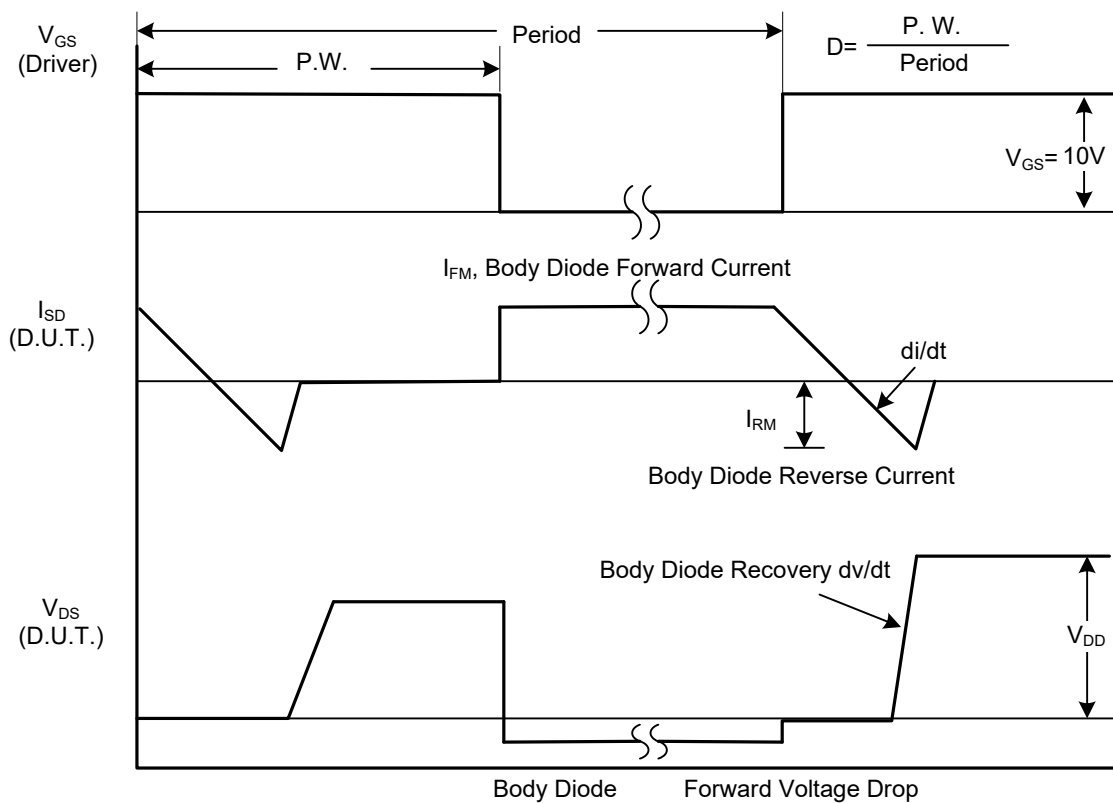
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

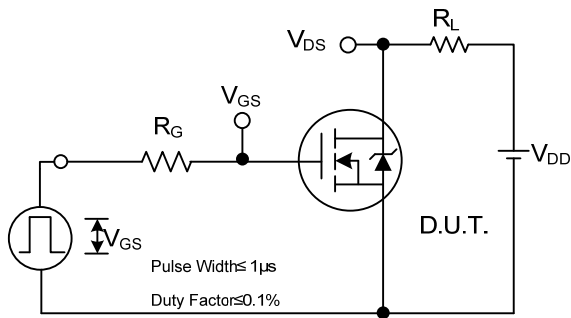


Peak Diode Recovery dv/dt Test Circuit

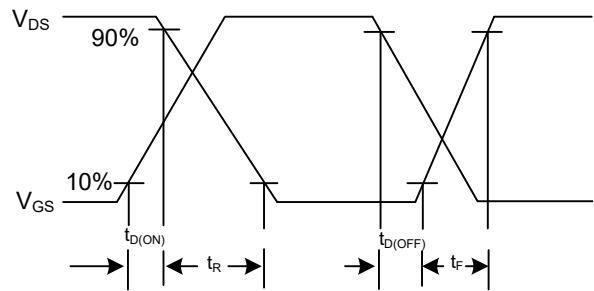


Peak Diode Recovery dv/dt Waveforms

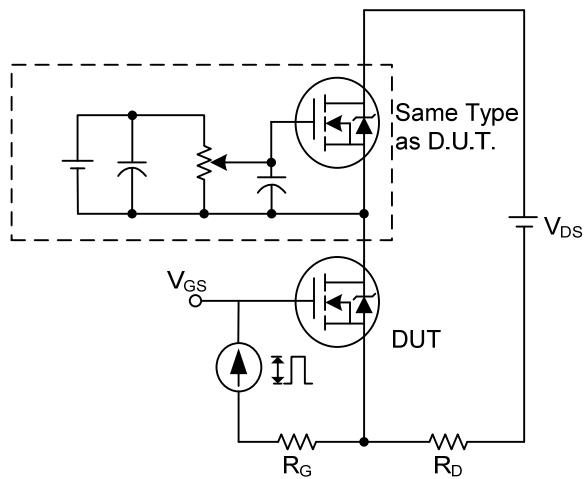
■ TEST CIRCUITS AND WAVEFORMS



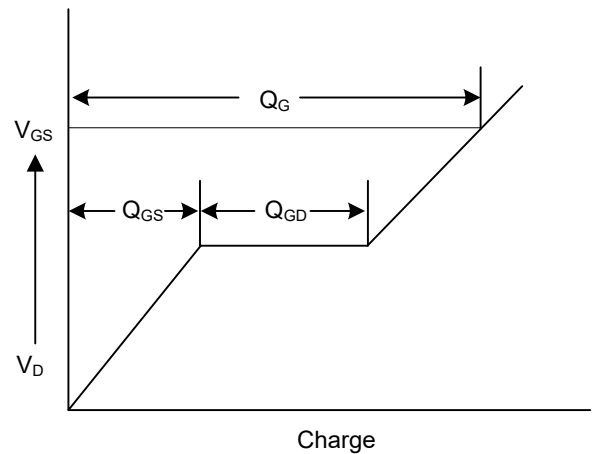
Switching Test Circuit



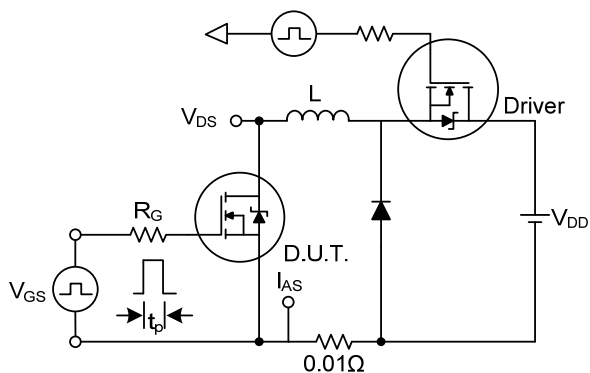
Switching Waveforms



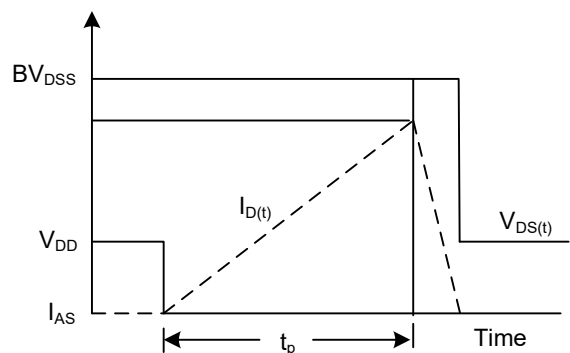
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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