

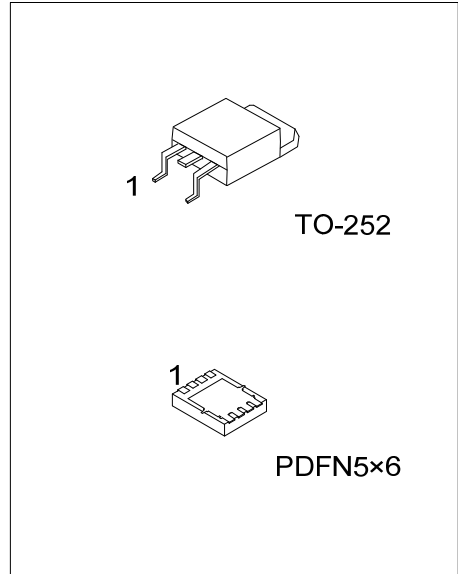


USG10R072M

Preliminary

Power MOSFET

**N-CHANNEL SGT
ENHANCEMENT POWER
MOSFET**



■ DESCRIPTION

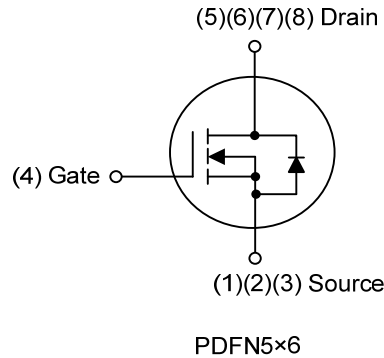
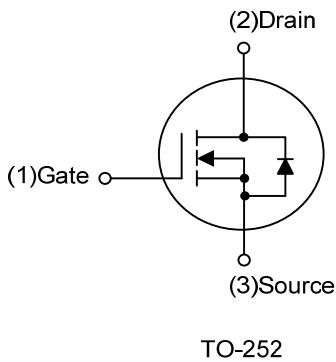
The UTC **USG10R072M** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with high switching speed and low gate charge, etc.

The UTC **USG10R072M** applies to primary side switch, synchronous rectifier, Motor Drives, etc.

■ FEATURES

- * $R_{DS(ON)} \leq 7.2 \text{ m}\Omega @ V_{GS}=10V, I_D=45A$
- $R_{DS(ON)} \leq 8.8 \text{ m}\Omega @ V_{GS}=4.5V, I_D=45A$
- * 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	
USG10R072ML-TN3-R	USG10R072MG-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
USG10R072ML-P5060-R	USG10R072MG-P5060-R	PDFN5x6	S	S	S	G	D	D	D	D	Tape Reel

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

<p>USG10R072MG-TN3-R</p> <ul style="list-style-type: none"> (1) Packing Type (2) Package Type (3) Green Package 	<ul style="list-style-type: none"> (1) R: Tape Reel (2) TN3: TO-252, P5060: PDFN5x6 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING

TO-252	PDFN5x6
<p data-bbox="391 347 558 380">UTC</p> <p data-bbox="391 380 558 414">USG10R072M</p> <p data-bbox="391 414 558 448">□□ □□□□</p> <p data-bbox="414 459 438 492">1</p> <p data-bbox="255 436 367 470">Lot Code ←</p> <p data-bbox="582 380 766 470">→ L: Lead Free → G: Halogen Free → Date Code</p>	<p data-bbox="1029 347 1181 380">UTC USG</p> <p data-bbox="1029 380 1181 414">10R072M</p> <p data-bbox="1029 414 1181 448">• □□□□□□</p> <p data-bbox="893 448 1005 481">Lot Code ←</p> <p data-bbox="1212 448 1324 481">→ 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}	50	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.72	V/ns
Power Dissipation	TO-252	P_D	60	W
	PDFN5x6		39	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. $L = 0.1\text{mH}$, $I_{AS} = 31.5\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, 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-252	θ_{JA}	110	$^\circ\text{C}/\text{W}$
	PDFN5x6		65	$^\circ\text{C}/\text{W}$
Junction to Case (Note)	TO-252	θ_{JC}	2.08	$^\circ\text{C}/\text{W}$
	PDFN5x6		3.2	$^\circ\text{C}/\text{W}$

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

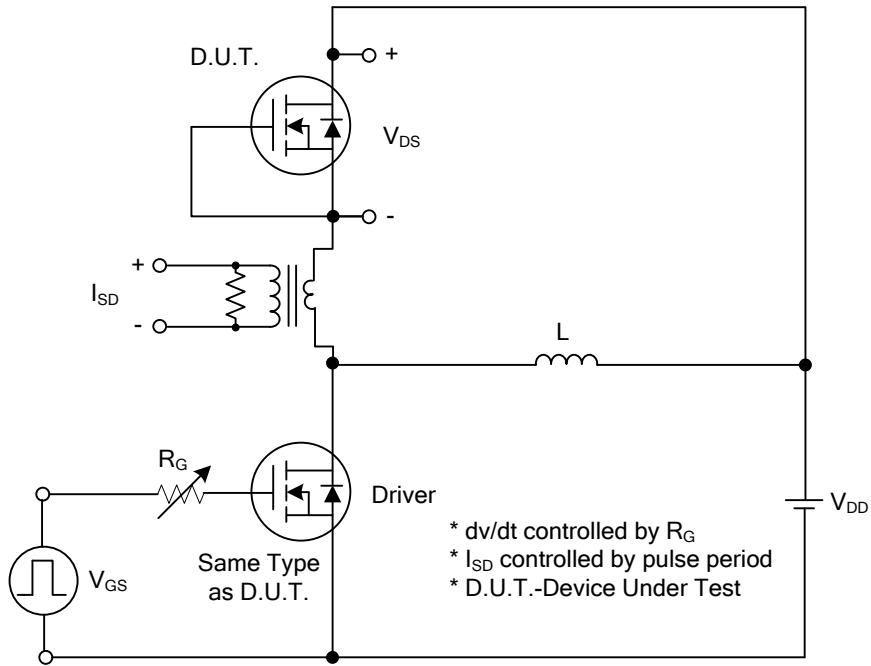
■ ELECTRICAL CHARACTERISTICS ($T_J=25^\circ\text{C}$, unless otherwise specified)

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	$V_{GS}=+20\text{V}$, $V_{DS}=0\text{V}$			+100	nA
	Reverse	$V_{GS}=-20\text{V}$, $V_{DS}=0\text{V}$			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1.0		2.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=45\text{A}$			7.2	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$, $I_D=45\text{A}$			8.8	$\text{m}\Omega$
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{DS}=25\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$		3253		pF
Output Capacitance	C_{OSS}			1352		pF
Reverse Transfer Capacitance	C_{RSS}			155		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{DS}=80\text{V}$, $V_{GS}=10\text{V}$, $I_D=90\text{A}$		89		nC
Gate to Source Charge	Q_{GS}			9.4		nC
Gate to Drain Charge	Q_{GD}			43		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=50\text{V}$, $V_{GS}=10\text{V}$, $I_D=90\text{A}$, $R_G=3\Omega$		10		ns
Rise Time	t_R			18		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			40		ns
Fall-Time	t_F			27		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}	$I_{SD}=75\text{A}$			1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_S=30\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		40		ns
Body Diode Reverse Recovery Charge	Q_{rr}			46		nC

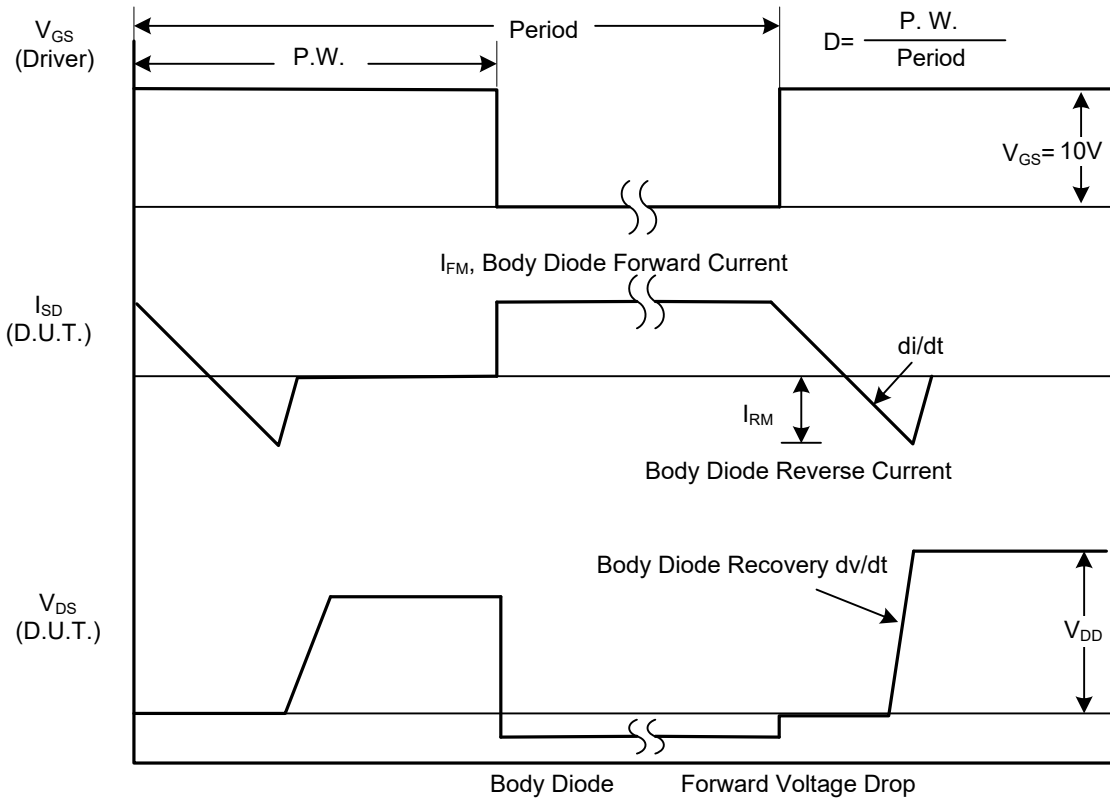
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

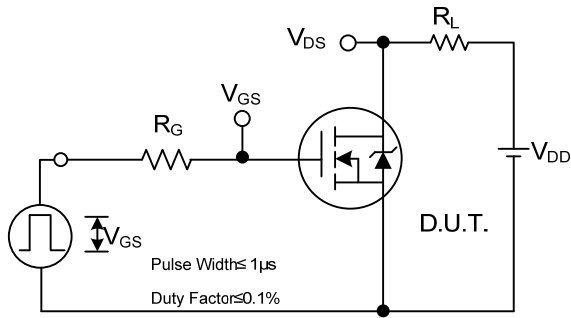


Peak Diode Recovery dv/dt Test Circuit

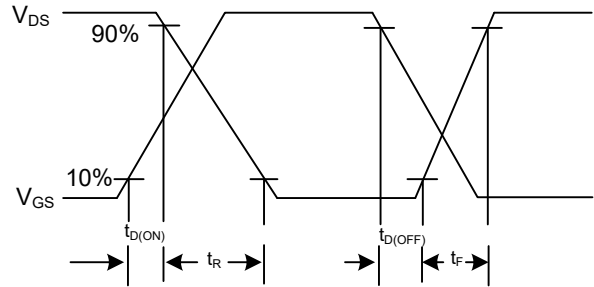


Peak Diode Recovery dv/dt Waveforms

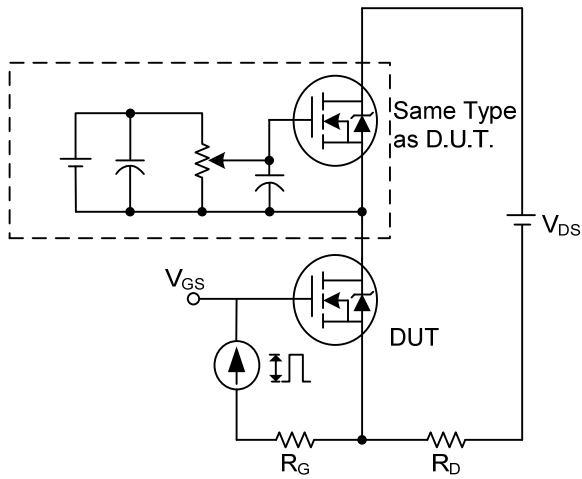
■ TEST CIRCUITS AND WAVEFORMS



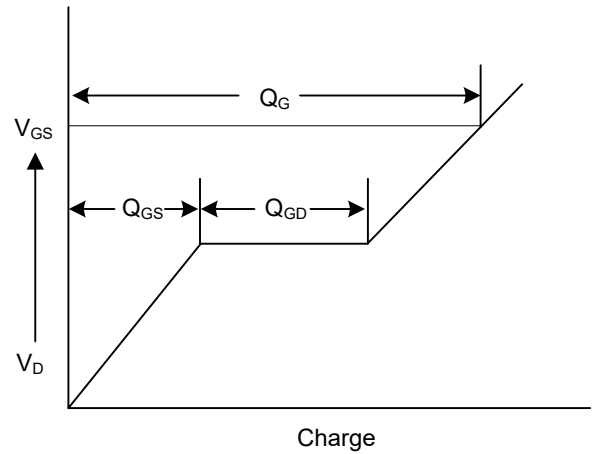
Switching Test Circuit



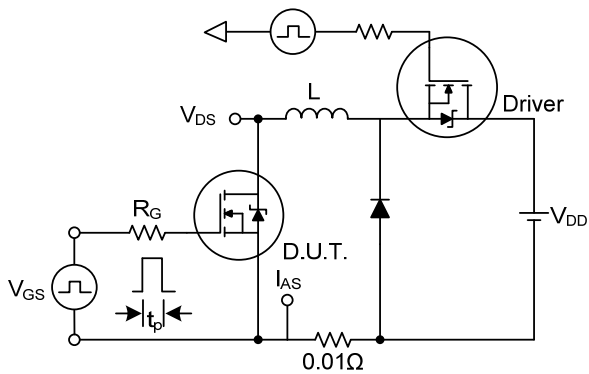
Switching Waveforms



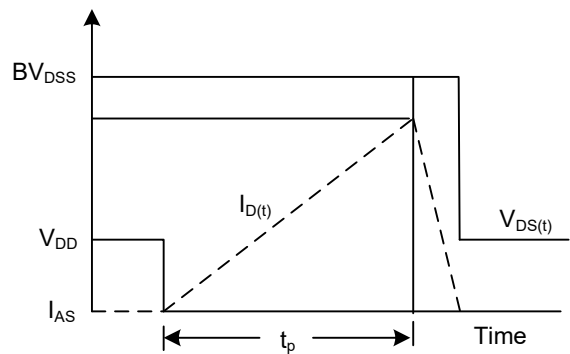
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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