



USG10R030M

Preliminary

Power MOSFET

**N-CHANNEL SGT
ENHANCEMENT POWER
MOSFET**

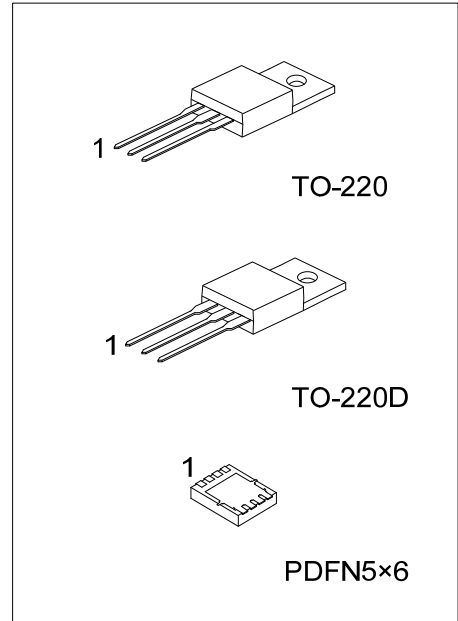
■ DESCRIPTION

The UTC **USG10R030M** 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.

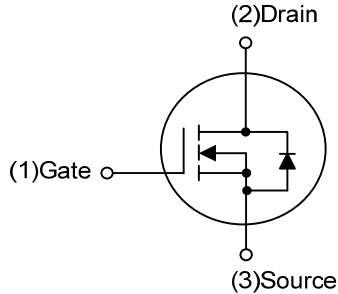
The UTC **USG10R030M** applies to primary side switch, synchronous rectifier, Motor Drives, etc.

■ FEATURES

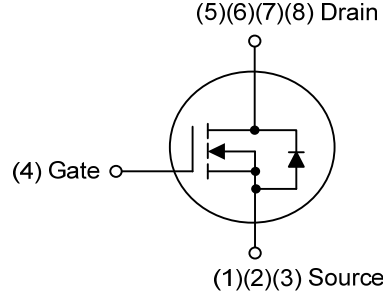
- * $R_{DS(ON)} \leq 3.0\ m\Omega$ @ $V_{GS} = 10V, I_D = 80A$
- $R_{DS(ON)} \leq 5.5\ m\Omega$ @ $V_{GS} = 4.5V, I_D = 40A$
- * High Cell Density Trench Technology
- * High Power and Current Handling Capability



■ SYMBOL



TO-220 / TO-220D



PDFN5x6

■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
USG10R030ML-TA3-T	USG10R030MG-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
USG10R030ML-TAD-T	USG10R030MG-TAD-T	TO-220D	G	D	S	-	-	-	-	-	Tube
USG10R030ML-P5060-R	USG10R030MG-P5060-R	PDFN5x6	S	S	S	G	D	D	D	D	Tape Reel

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

<p>USG10R030MG-TA3-T</p> <ul style="list-style-type: none"> (1) Packing Type (2) Package Type (3) Green Package 	<ul style="list-style-type: none"> (1) T: Tube, R: Tape Reel (2) TA3: TO-220, TAD: TO-220D, P5060: PDFN5x6 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING

TO-220 / TO-220D	PDFN5x6
<p data-bbox="359 347 550 380">UTC</p> <p data-bbox="359 380 550 414">USG10R030M</p> <p data-bbox="359 414 550 448">□□ □□□□</p> <p data-bbox="359 448 550 481">1</p> <p data-bbox="582 392 750 425">L: Lead Free</p> <p data-bbox="582 425 750 459">G: Halogen Free</p> <p data-bbox="582 459 694 492">Date Code</p> <p data-bbox="223 448 319 481">Lot Code</p>	<p data-bbox="1005 347 1157 380">UTC USG</p> <p data-bbox="1005 380 1157 414">10R030M</p> <p data-bbox="1005 414 1157 448">• □□□□□□</p> <p data-bbox="869 459 965 492">Lot Code</p> <p data-bbox="1189 459 1300 492">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	170	A
	Pulsed (Note 2)	I_{DM}	340	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	21	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.1	V/ns
Power Dissipation	TO-220/TO-220D	P_D	190	W
	PDFN5x6		240	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. $L = 0.1\text{mH}$, $I_{AS} = 20\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, 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

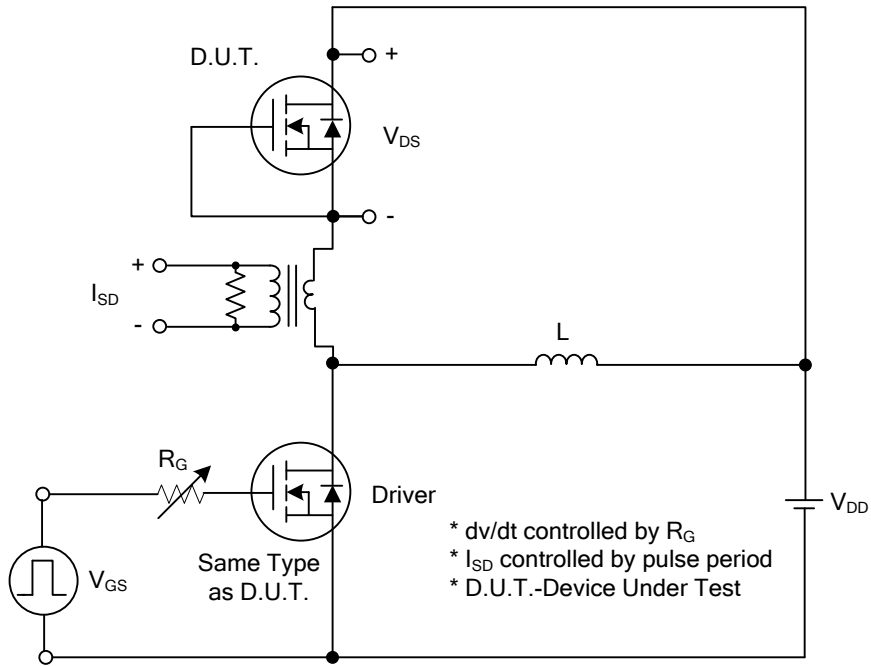
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220D	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	PDFN5x6		50	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220/TO-220D	θ_{JC}	0.66	$^\circ\text{C}/\text{W}$
	PDFN5x6		0.52	$^\circ\text{C}/\text{W}$

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

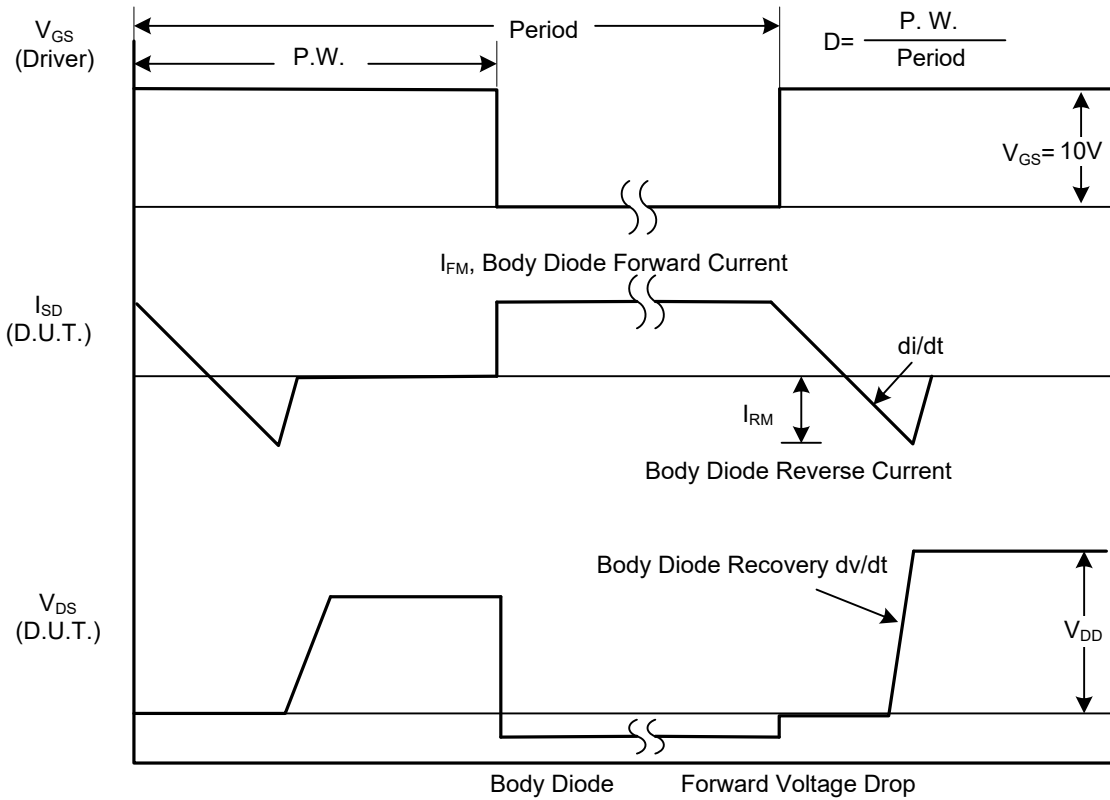
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTIC						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	100			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$			1	μA
Gate-Source Leakage Current	Forward	$V_{GS}=+20\text{V}$, $V_{DS}=0\text{V}$			+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	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=80\text{A}$			3.0	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$, $I_D=40\text{A}$			5.5	$\text{m}\Omega$
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{DS}=25\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$		10.3		nF
Output Capacitance	C_{OSS}			3595		pF
Reverse Transfer Capacitance	C_{RSS}			194		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{DS}=80\text{V}$, $V_{GS}=10\text{V}$, $I_D=170\text{A}$		215		nC
Gate to Source Charge	Q_{GS}			38		nC
Gate to Drain Charge	Q_{GD}			61		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=50\text{V}$, $V_{GS}=10\text{V}$, $I_D=170\text{A}$, $R_G=3\Omega$		19		ns
Rise Time	t_R			24		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			117		ns
Fall-Time	t_F			46		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				170	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}	$I_S=30\text{A}$, $di/dt=100\text{A}/\mu\text{s}$		232		ns
Body Diode Reverse Recovery Charge	Q_{rr}				781	

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

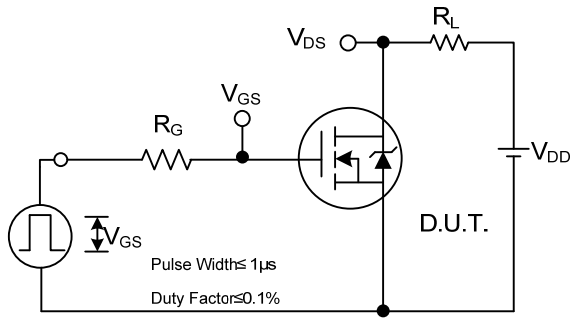


Peak Diode Recovery dv/dt Test Circuit

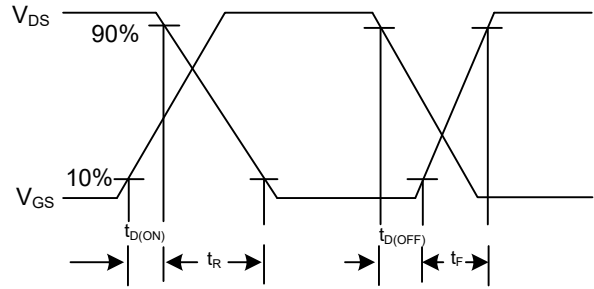


Peak Diode Recovery dv/dt Waveforms

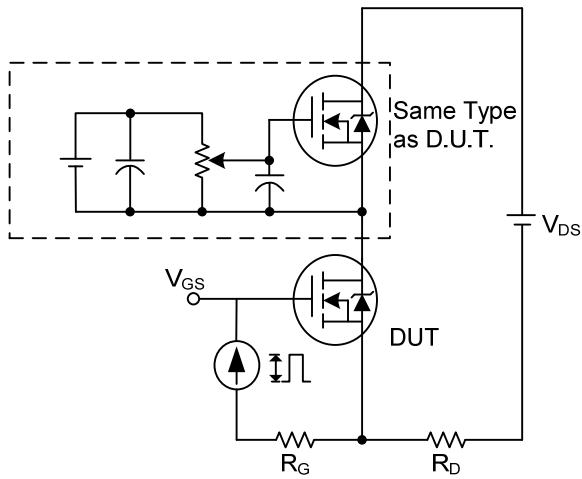
■ TEST CIRCUITS AND WAVEFORMS



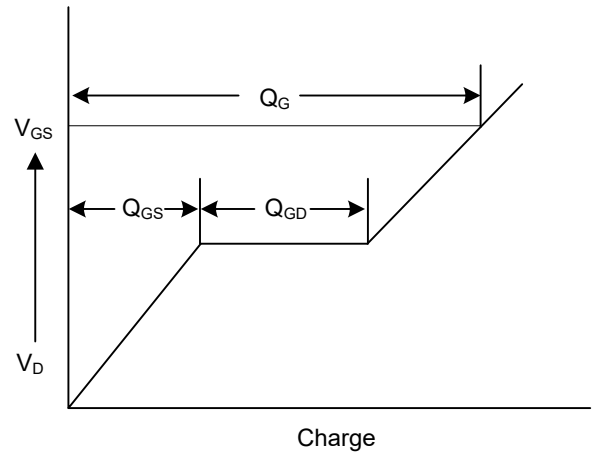
Switching Test Circuit



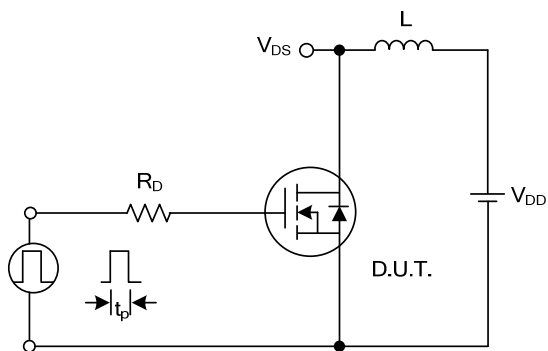
Switching Waveforms



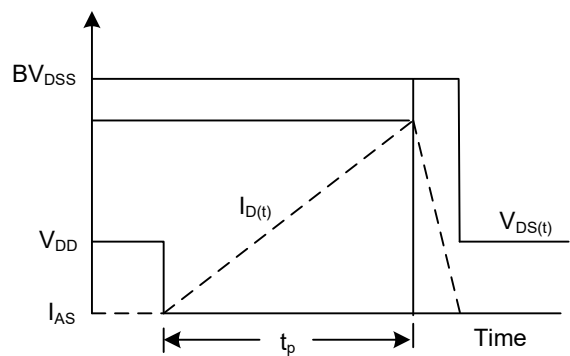
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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