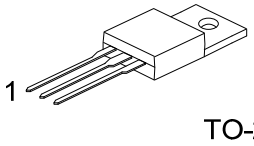
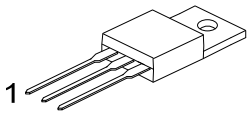
USG10R030M

Preliminary | ***Power MOSFET***

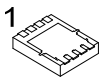
N-CHANNEL SGT ENHANCEMENT POWER MOSFET



TO-220



TO-220D



PDFN5×6

■ DESCRIPTION

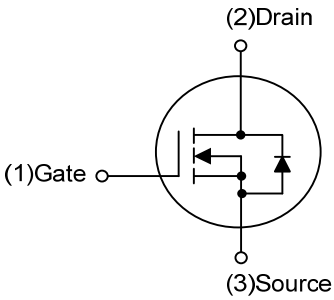
The UTC **USG10R030M** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with high switching speed and low gate charge, etc.

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

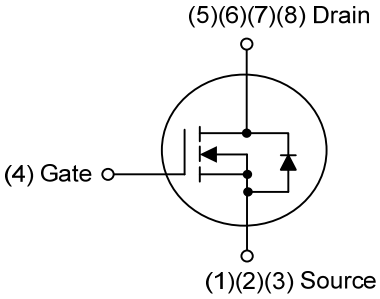
■ FEATURES

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

■ SYMBOL



TO-220 / TO-220D



PDFN5×6

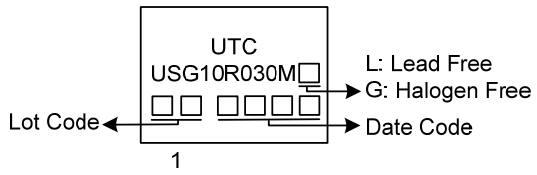
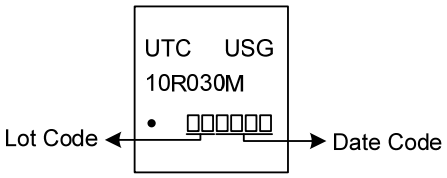
■ ORDERING INFORMATION

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	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

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

USG10R030MG-TA3-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TAD: TO-220D, P5060: PDFN5×6 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

TO-220 / TO-220D	PDFN5×6
	

■ 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	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
	PDFN5×6		240	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} = 20A, 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

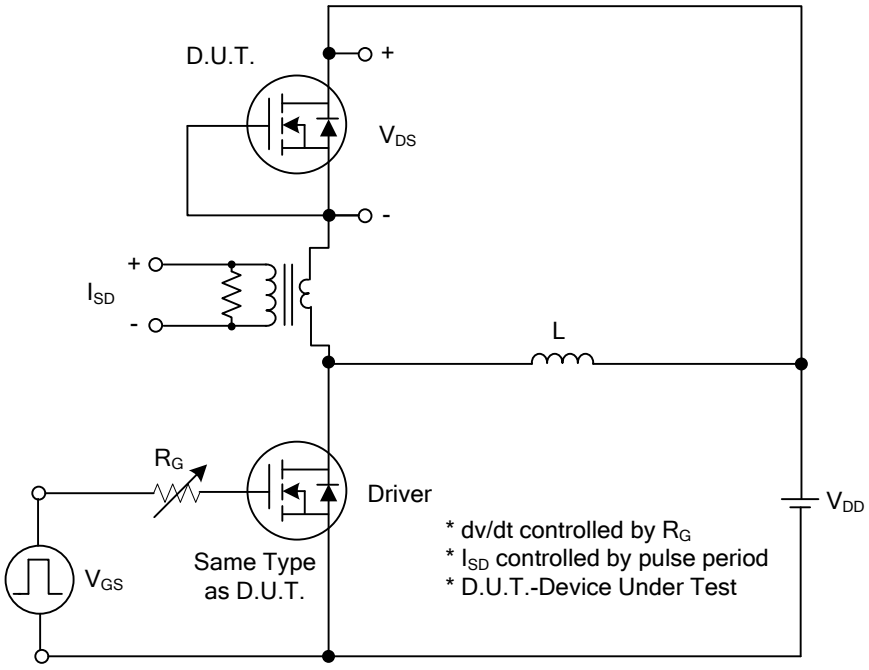
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220D	θ_{JA}	62.5	°C/W
	PDFN5×6		50	°C/W
Junction to Case	TO-220/TO-220D	θ_{JC}	0.66	°C/W
	PDFN5×6		0.52	°C/W

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

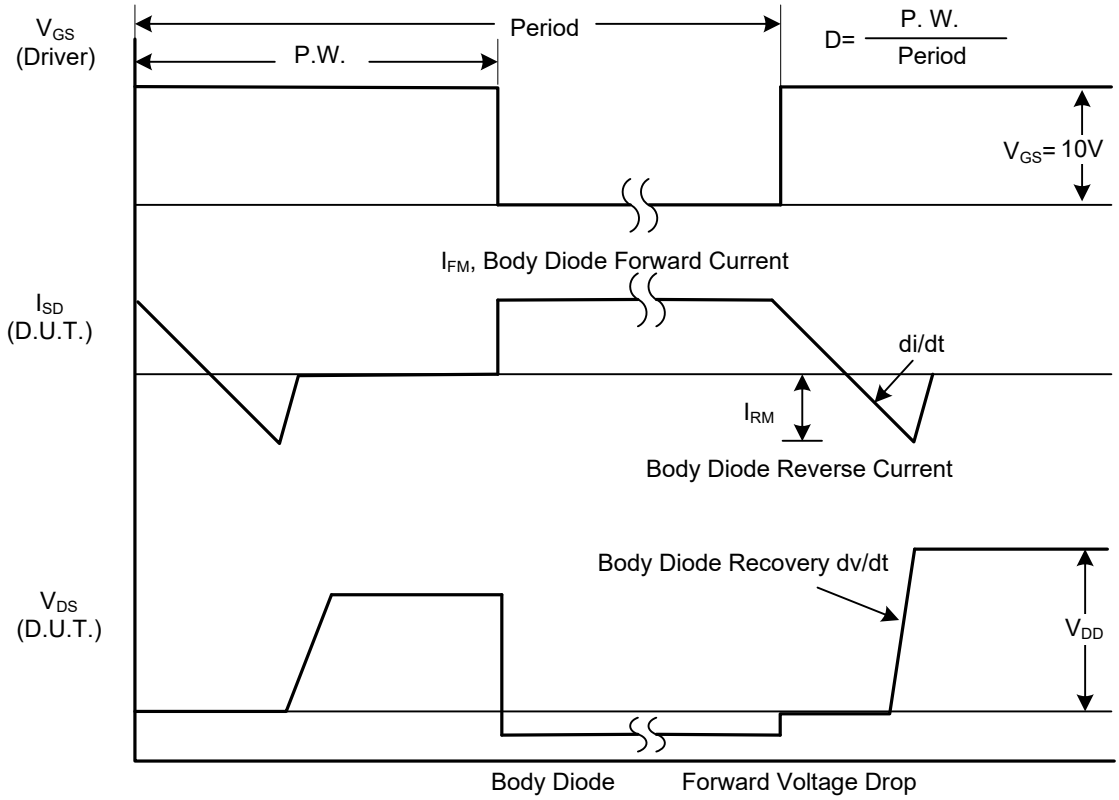
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTIC							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	100			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=100V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	1.0		2.5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=80A			3.0	mΩ
			V_{GS}=4.5V, I_D=40A			5.5	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz		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}=80V, V_{GS}=10V, I_D=170A		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}=50V, V_{GS}=10V, I_D=170A, R_G =3Ω		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=170A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time		t_{rr}	I_S=30A, dI/dt=100A/μs		232		ns
Body Diode Reverse Recovery Charge		Q_{rr}			781		nC

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

■ TEST CIRCUITS AND WAVEFORMS

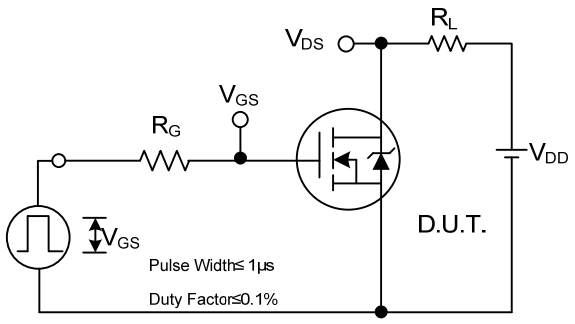


Peak Diode Recovery dv/dt Test Circuit

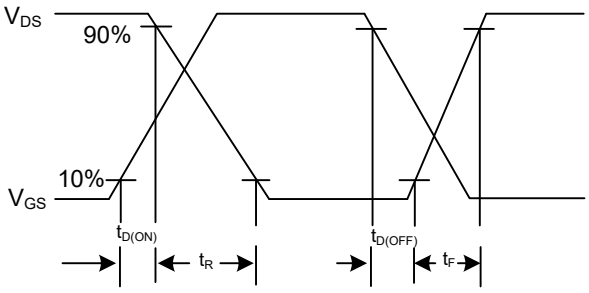


Peak Diode Recovery dv/dt Waveforms

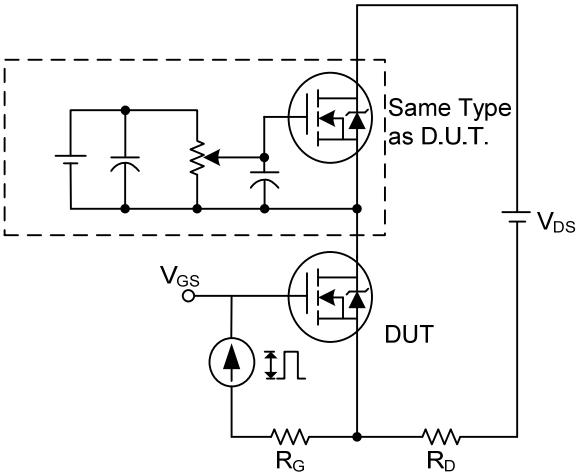
■ TEST CIRCUITS AND WAVEFORMS



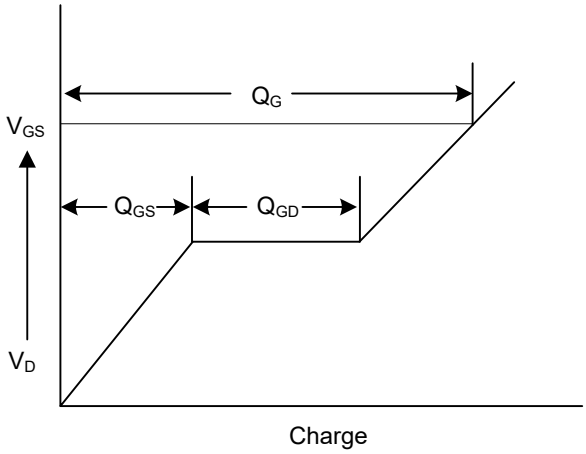
Switching Test Circuit



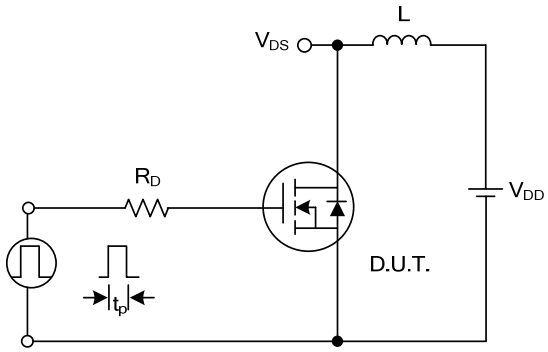
Switching Waveforms



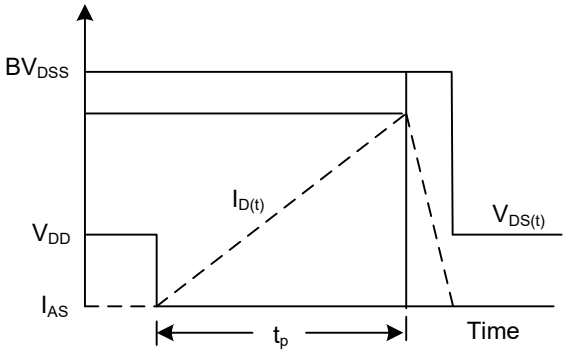
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms