



USG10R100M

Preliminary

Power MOSFET

**N-CHANNEL SGT
ENHANCEMENT POWER
MOSFET**

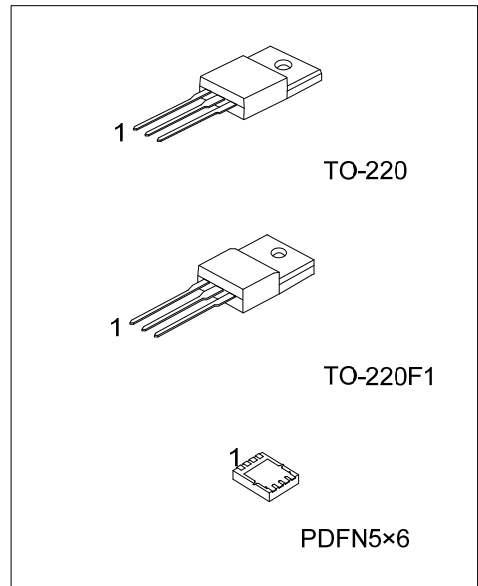
■ DESCRIPTION

The UTC **USG10R100M** 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.

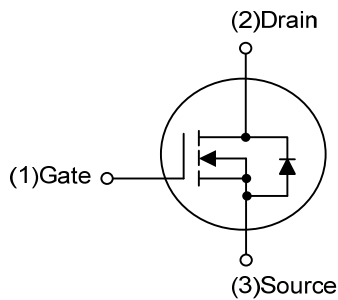
The UTC **USG10R100M** applies to primary side switch, synchronous rectifier, Motor Drives, etc.

■ FEATURES

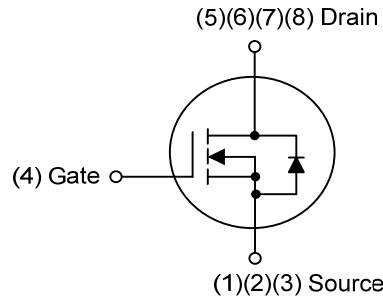
- * $R_{DS(ON)} \leq 10 \text{ m}\Omega @ V_{GS}=10V, I_D=30A$
- $R_{DS(ON)} \leq 14 \text{ m}\Omega @ V_{GS}=4.5V, I_D=30A$
- * High Cell Density Trench Technology
- * High Power and Current Handling Capability



■ SYMBOL



TO-220 / TO-220F1



PDFN5x6

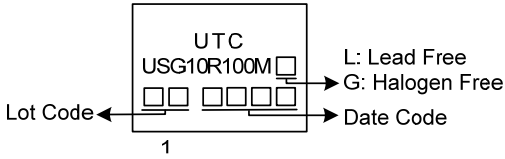
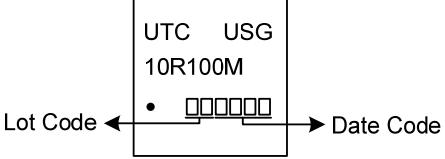
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
USG10R100ML-TA3-T	USG10R100MG-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
USG10R100ML-TF1-T	USG10R100MG-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tape Reel
USG10R100ML-P5060-R	USG10R100MG-P5060-R	PDFN5x6	S	S	S	G	D	D	D	D	Tape Reel

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

<p>USG10R100MG-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF1: TO-220F1, P5060: PDFN5x6</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING

TO-220 / TO-220F1	PDFN5×6
 <p>UTC USG10R100M □ □□ □□□□ L: Lead Free G: Halogen Free Date Code Lot Code 1</p>	 <p>UTC USG 10R100M • □□□□□ Date Code Lot 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	60	A
	Pulsed (Note 2)	I_{DM}	120	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	31	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.7	V/ns
Power Dissipation	TO-220	P_D	90	W
	TO-220F1		30	W
	PDFN5×6		32	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. $L = 0.1\text{mH}$, $I_{AS} = 24.8\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, 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-220F1	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	PDFN5×6		65 (Note)	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.38	$^\circ\text{C}/\text{W}$
	TO-220F1		4.16	$^\circ\text{C}/\text{W}$
	PDFN5×6		3.9 (Note)	$^\circ\text{C}/\text{W}$

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

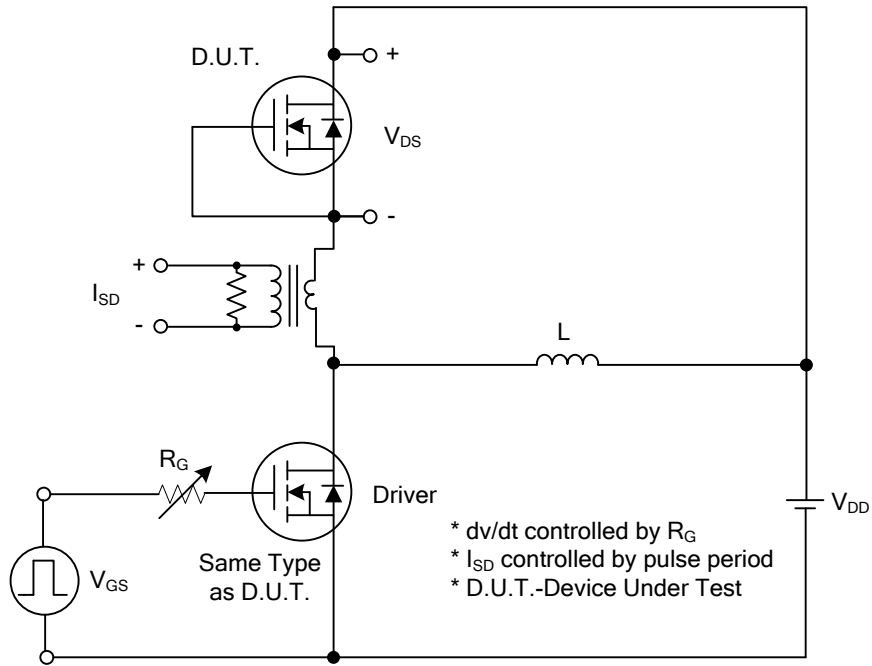
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
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}			+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 =30A		8.6	10	mΩ
		V _{GS} =4.5V, I _D =30A		11.2	14	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		2052		pF
Output Capacitance	C _{OSS}			852		pF
Reverse Transfer Capacitance	C _{RSS}			107		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{DS} =80V, V _{GS} =10V, I _D =60A		56		nC
Gate to Source Charge	Q _{GS}			23		nC
Gate to Drain Charge	Q _{GD}			4.4		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =50V, V _{GS} =10V, I _D =60A, R _G =3Ω		8.3		ns
Rise Time	t _R			17		ns
Turn-OFF Delay Time	t _{D(OFF)}			34		ns
Fall-Time	t _F			21		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				60	A
Maximum Body-Diode Pulsed Current	I _{SM}				120	A
Drain-Source Diode Forward Voltage	V _{SD}	I _{SD} =60A			1.4	V
Body Diode Reverse Recovery Time	t _{rr}	I _S =30A, di/dt=100A/μs		256		ns
Body Diode Reverse Recovery Charge	Q _{rr}				860	

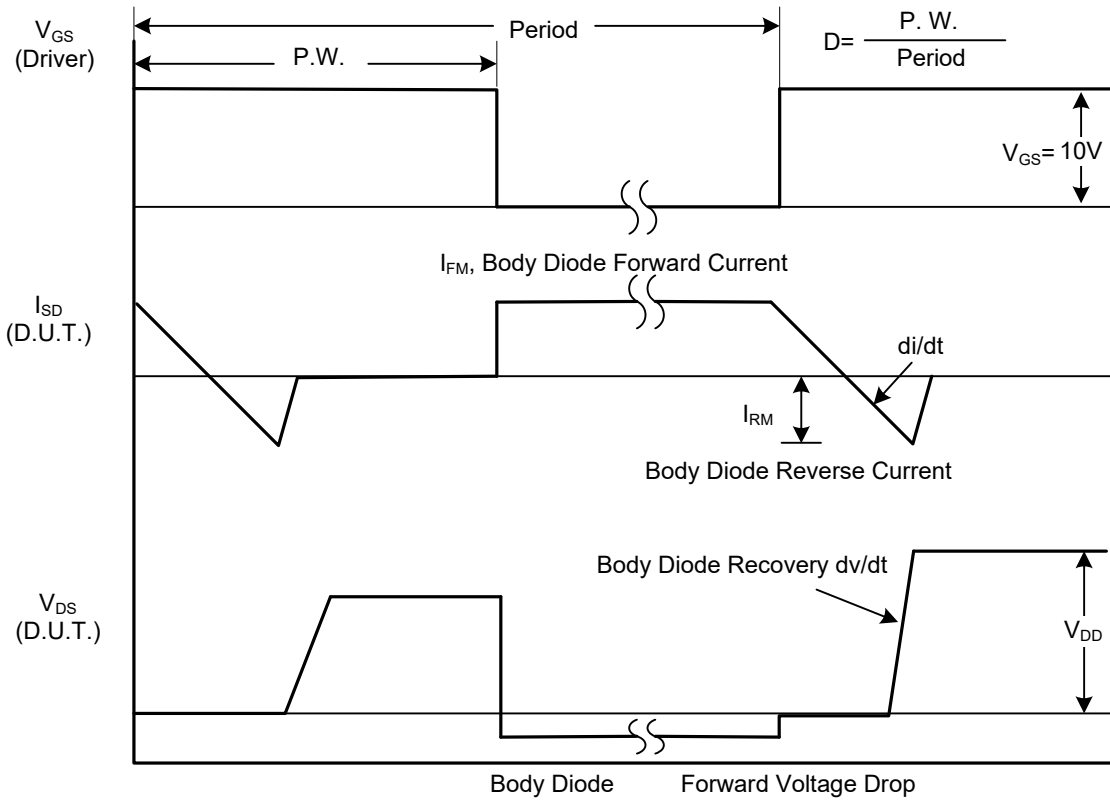
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

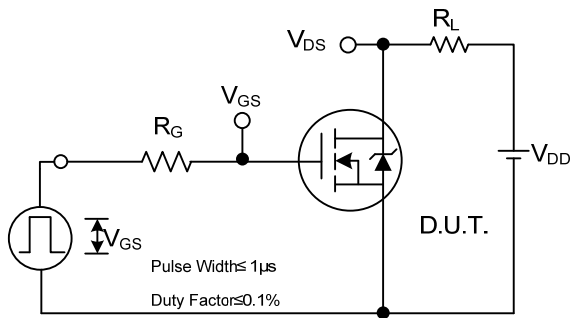


Peak Diode Recovery dv/dt Test Circuit

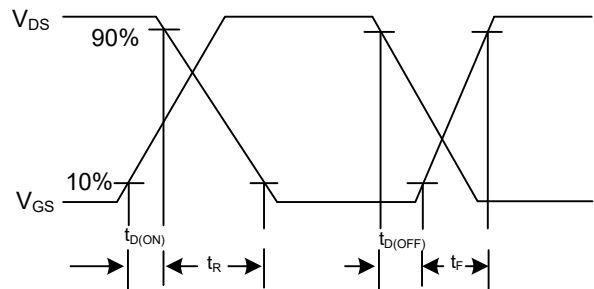


Peak Diode Recovery dv/dt Waveforms

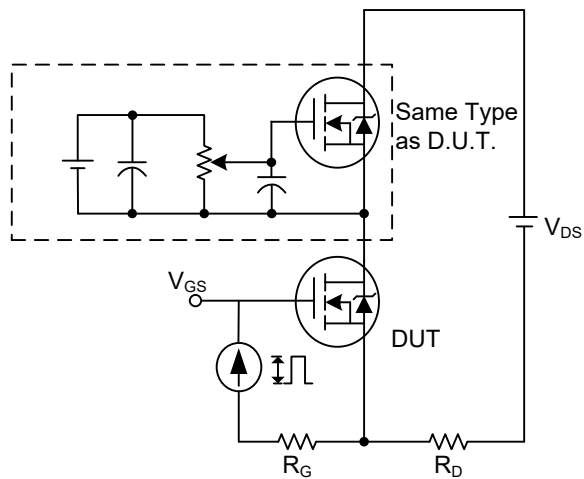
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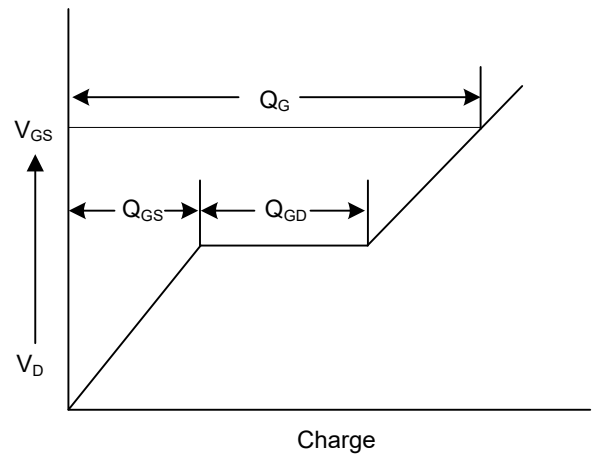
Switching Test Circuit



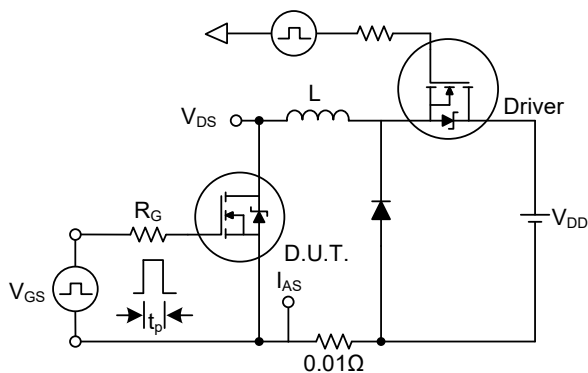
Switching Waveforms



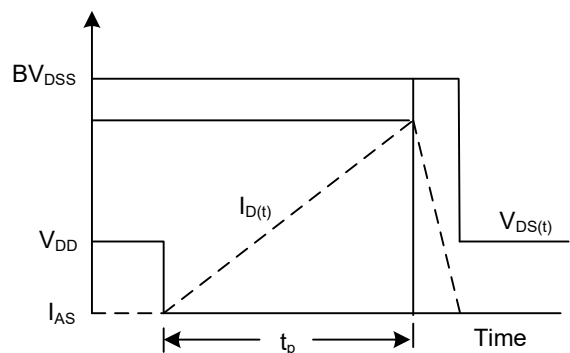
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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