



## USG10R068M

Preliminary

POWER MOSFET

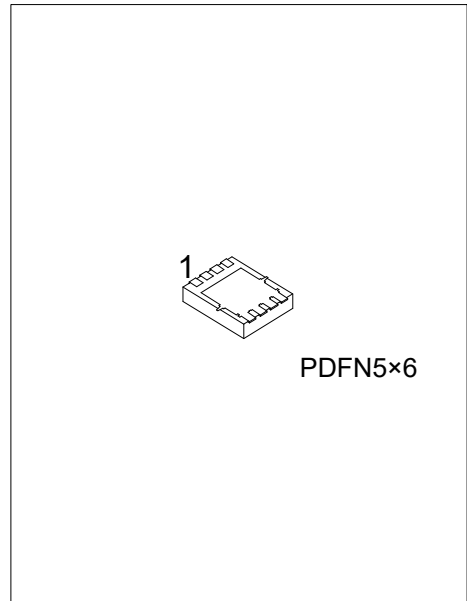
### N-CHANNEL SGT ENHANCEMENT POWER MOSFET

#### DESCRIPTION

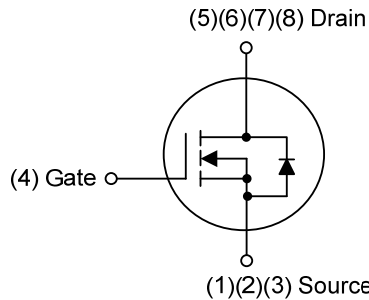
The UTC **USG10R068M** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with low  $R_{DS(ON)}$  characteristic by high cell density trench technology.

#### FEATURES

- \*  $R_{DS(ON)} \leq 6.8 \text{ m}\Omega @ V_{GS}=10V, I_D=30A$
- \*  $R_{DS(ON)} \leq 9.0 \text{ m}\Omega @ V_{GS}=4.5V, I_D=20A$
- \* Extremely low on-resistance  $R_{DS(ON)}$
- \* Excellent Low Ciss



#### SYMBOL



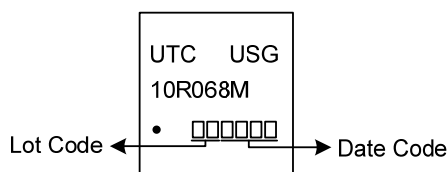
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment						Packing		
Lead Free	Halogen Free		1	2	3	4	5	6		7	8
USG10R068ML-P5060-R	USG10R068MG-P5060-R	PDFN5x6	S	S	S	G	D	D	D	D	Tape Reel

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

<p>USG10R068MG-P5060-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) P5060: PDFN5x6 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



■ ABSOLUTE MAXIMUM RATING ( $T_C=25^\circ\text{C}$  unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	$V_{DSS}$	100	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current	DC	$I_D$	90
	Pulsed (Note 2)	$I_{DM}$	180
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	2
Peak Diode Recovery dv/dt (Note 4)	dv/dt	3.3	V/ns
Power Dissipation	$P_D$	53	W
Junction Temperature	$T_J$	+150	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-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.  $L = 0.1\text{mH}$ ,  $I_{AS} = 6.3\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\ \Omega$ , Starting  $T_J = 25^\circ\text{C}$

4.  $I_{SD} \leq 30\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	65	$^\circ\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	2.36	$^\circ\text{C}/\text{W}$

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

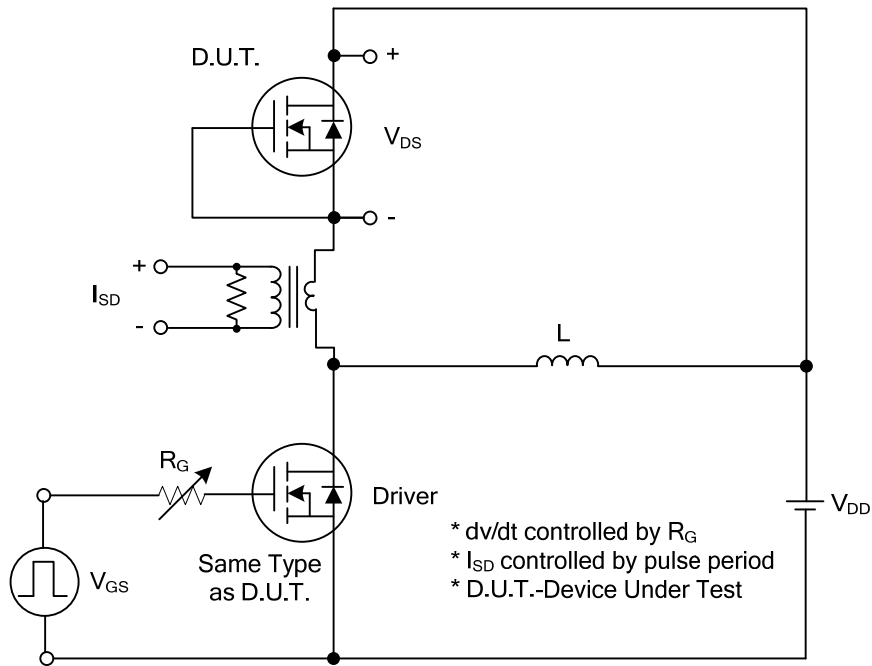
■ ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	100			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V			1	μA
Gate-Source Leakage Current	Forward	I <sub>GSS</sub> V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V			+100	nA
	Reverse		V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V			-100
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0		2.5	V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A			6.8	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A			9.0	mΩ
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		2765		pF
Output Capacitance	C <sub>OSS</sub>			1445		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			185		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =80V, V <sub>GS</sub> =10V, I <sub>D</sub> =90A (Note 1, 2)		74		nC
Gate to Source Charge	Q <sub>GS</sub>			9		nC
Gate to Drain Charge	Q <sub>GD</sub>			27		nC
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =90A, R <sub>G</sub> =3Ω (Note 1, 2)		12		ns
Rise Time	t <sub>R</sub>			20		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			45		ns
Fall-Time	t <sub>F</sub>			23		ns
<b>SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>				90	A
Maximum Pulsed Drain-Source Diode Forward Current	I <sub>SM</sub>				180	A
Diode Forward Voltage	V <sub>SD</sub>	I <sub>F</sub> =90A, V <sub>GS</sub> =0V			1.4	V
Reverse Recovery Time (Note 1)	t <sub>rr</sub>	I <sub>S</sub> =30A, V <sub>GS</sub> =0V, dI <sub>F</sub> /dt = 100A/μs		57		ns
Reverse Recovery Charge	Q <sub>rr</sub>				108	

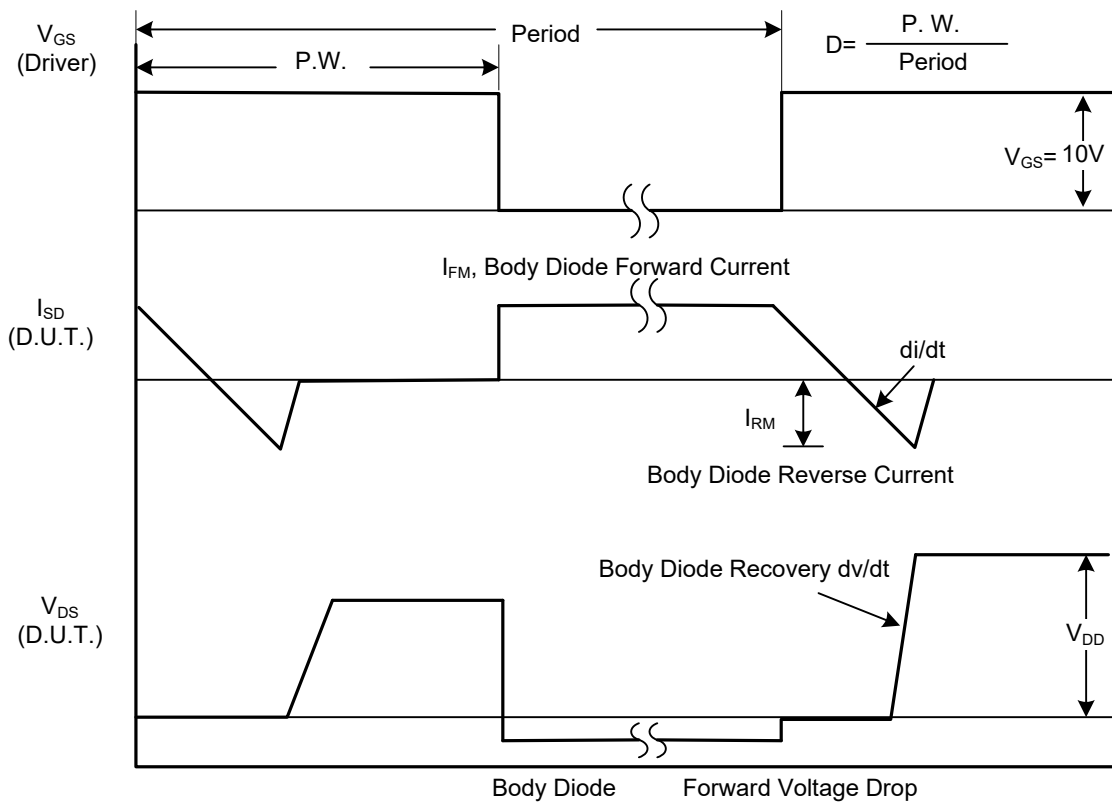
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

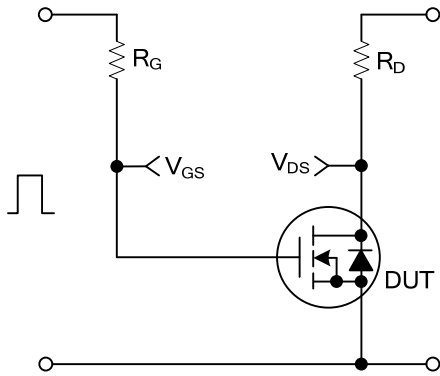


Peak Diode Recovery  $dv/dt$  Test Circuit

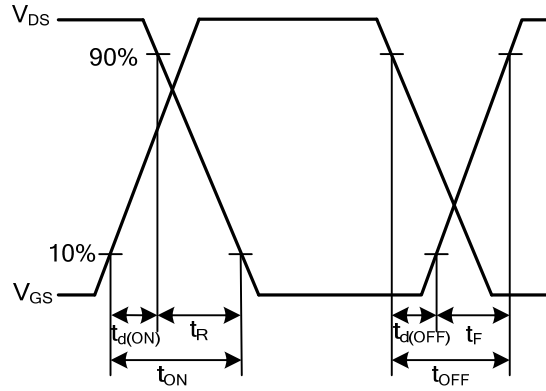


Peak Diode Recovery  $dv/dt$  Waveforms

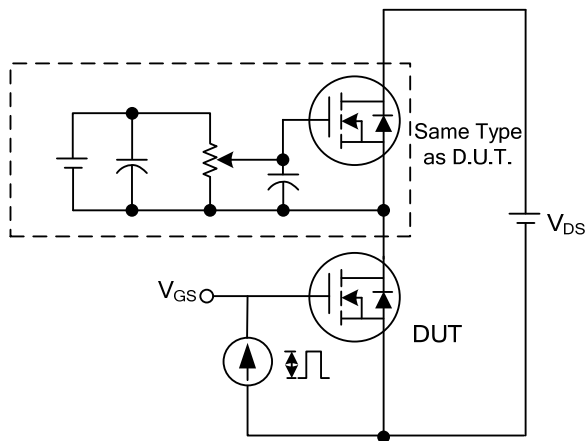
■ TEST CIRCUITS AND WAVEFORMS



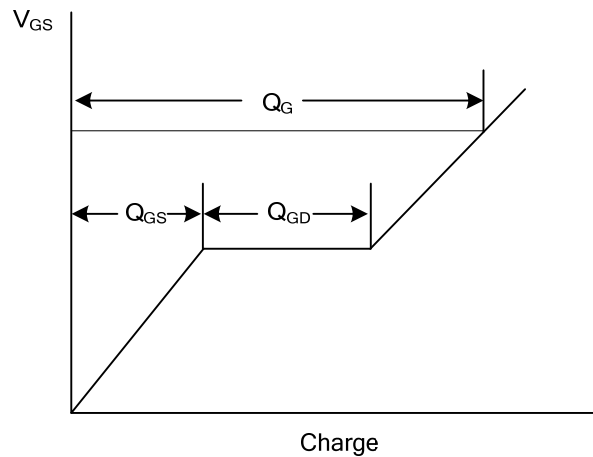
Switching Test Circuit



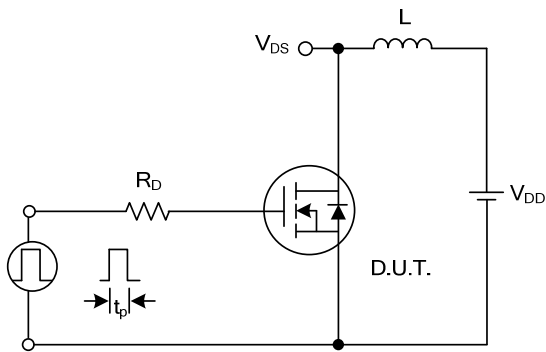
Switching Waveforms



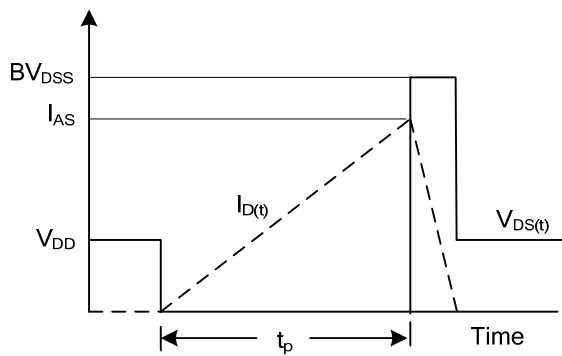
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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