



USG085R031H

Preliminary

POWER MOSFET

N-CHANNEL SGT ENHANCEMENT POWER MOSFET

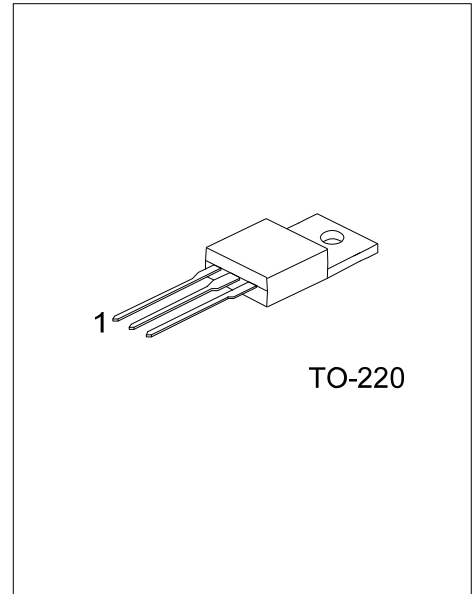
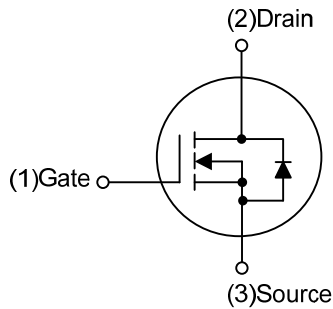
DESCRIPTION

The UTC **USG085R031H** 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

- * $R_{DS(ON)} \leq 3.1 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=50\text{A}$
- * Extremely low on-resistance $R_{DS(ON)}$
- * Excellent Low Ciss

SYMBOL



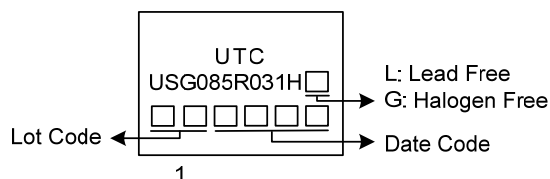
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
USG085R031HL-TA3-T	USG085R031HG-TA3-T	TO-220	G	D	S	Tube

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

USG085R031HG-TA3-T	(1)Packing Type	(1) T: Tube
	(2)Package Type	(2) TA3: TO-220
	(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V _{DSS}	85	V
Gate-Source Voltage		V _{GSS}	±20	V
Drain Current	DC	I _D	110	A
	Pulsed (Note 2)	I _{DM}	220	A
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	65	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2	V/ns
Power Dissipation		P _D	180	W
Junction Temperature		T _J	+150	°C
Storage Temperature Range		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. $L = 0.1\text{mH}$, $I_{AS} = 36.1\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$, 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	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
Junction to Case	θ_{JC}	0.69	$^{\circ}\text{C}/\text{W}$

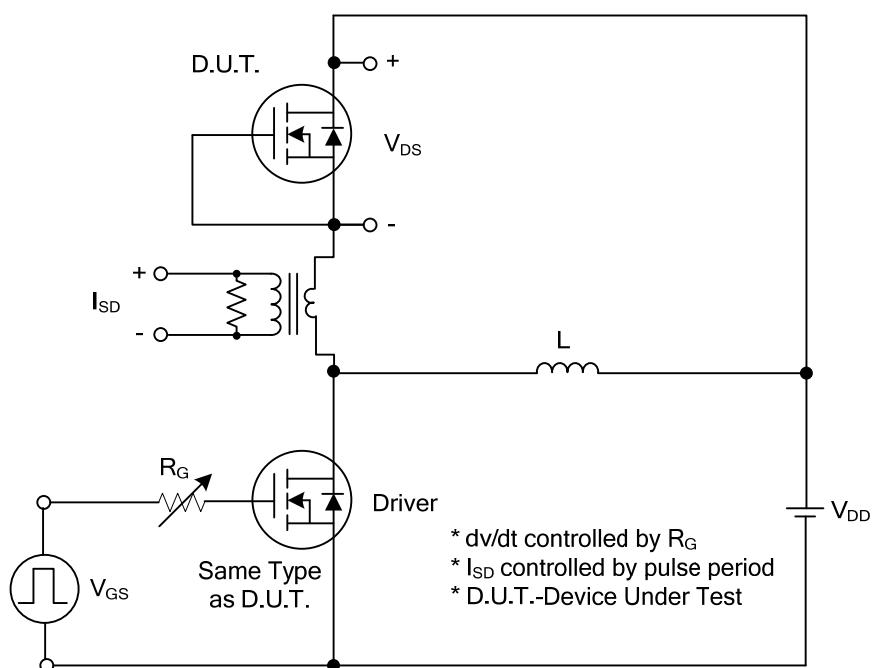
■ ELECTRICAL CHARACTERISTICS ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	85			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =85V, 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	2.0		4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =50A			3.1	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		6706		pF
Output Capacitance		C _{OSS}			1777		pF
Reverse Transfer Capacitance		C _{RSS}			480		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =68V, V _{GS} =10V, I _D =27.5A (Note 1, 2)		142		nC
Gate to Source Charge		Q _{GS}			29		nC
Gate to Drain Charge		Q _{GD}			11		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =42.5V, V _{GS} =10V, I _D =27.5A, R _G =3Ω (Note 1, 2)		23		ns
Rise Time		t _R			24		ns
Turn-OFF Delay Time		t _{D(OFF)}			75		ns
Fall-Time		t _F			47		ns
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				110	A
Diode Forward Voltage		V _{SD}	I _F =110A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)		t _{rr}	I _S =30A, V _{GS} =0V,		72		nS
Reverse Recovery Charge		Q _{rr}	dI _F /dt =100A/μs		155		nC

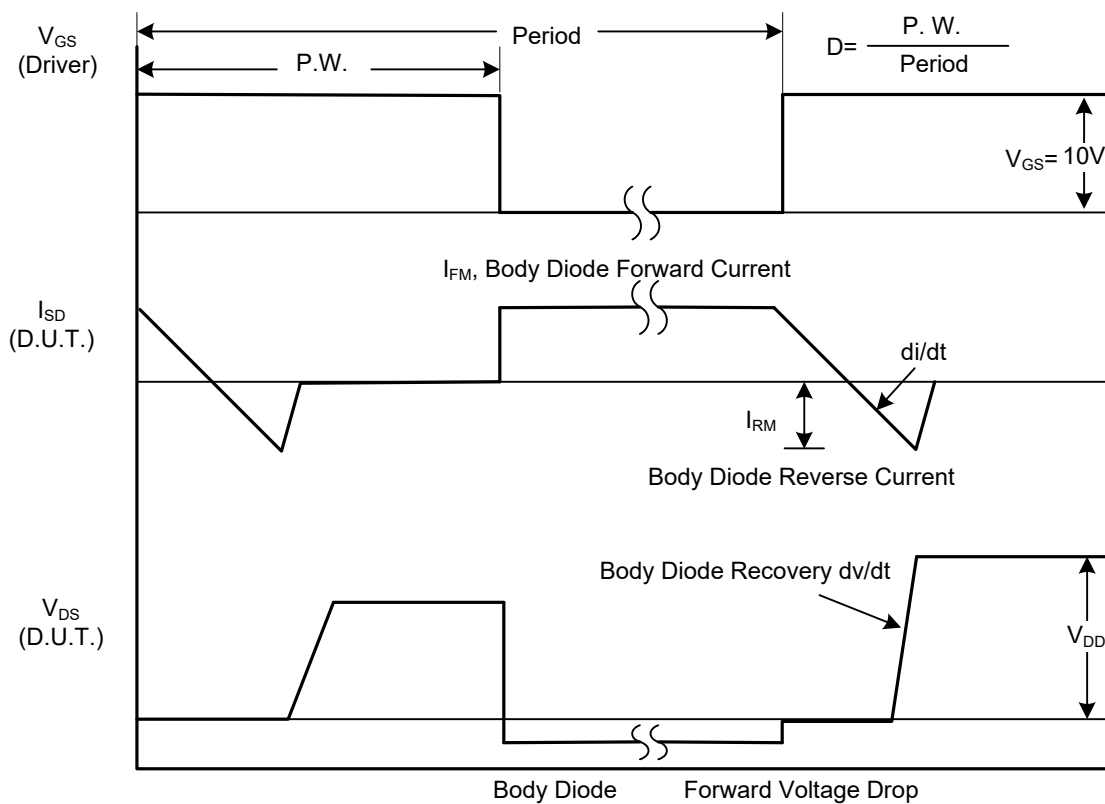
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

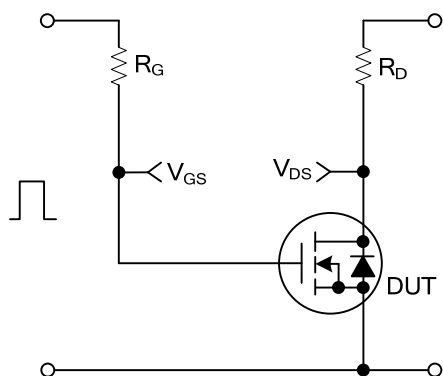


Peak Diode Recovery dv/dt Test Circuit

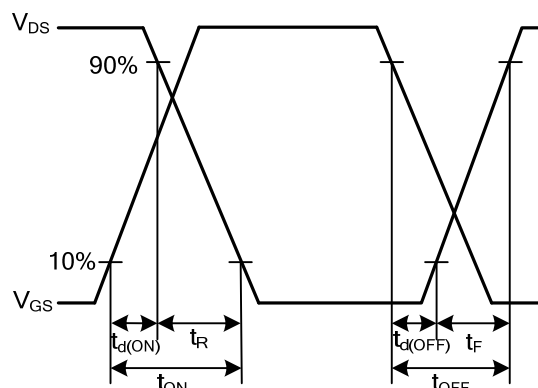


Peak Diode Recovery dv/dt Waveforms

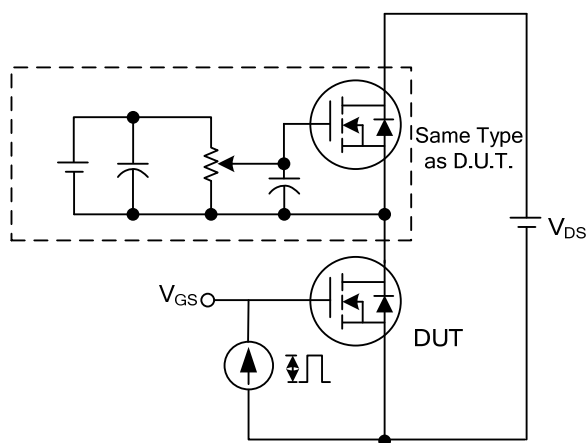
■ TEST CIRCUITS AND WAVEFORMS



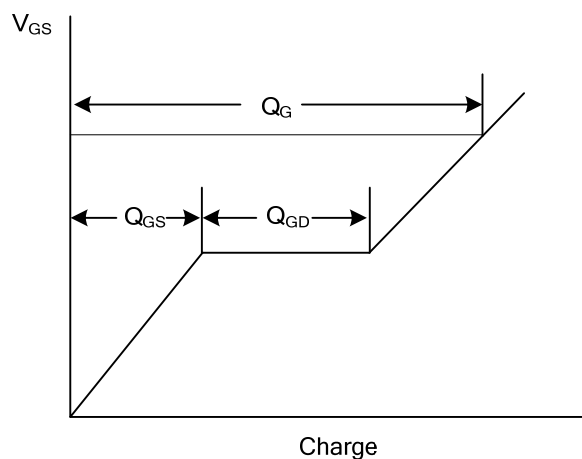
Switching Test Circuit



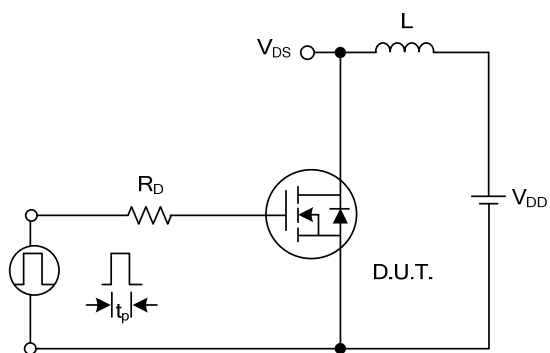
Switching Waveforms



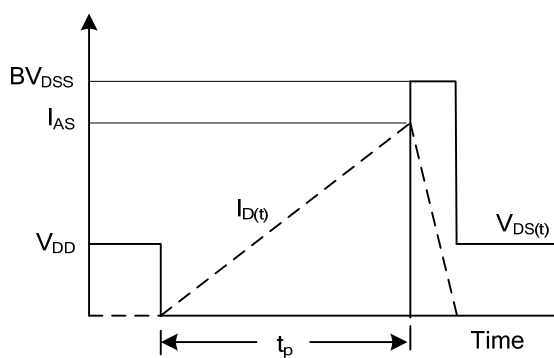
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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