



## USG085R035H-T

Preliminary

POWER MOSFET

### 100A, 85V N-CHANNEL POWER MOSFET

#### DESCRIPTION

The UTC **USG085R035H-T** 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.

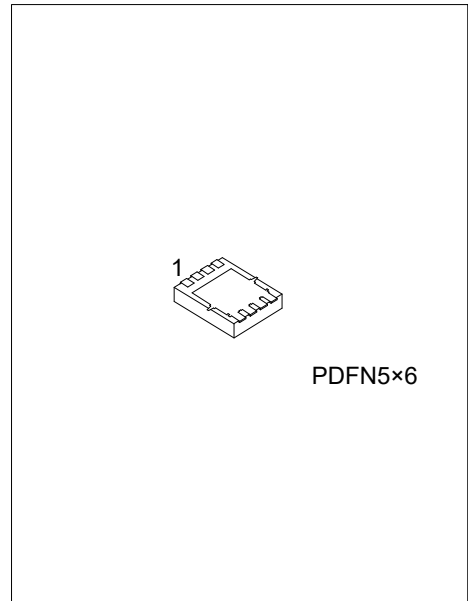
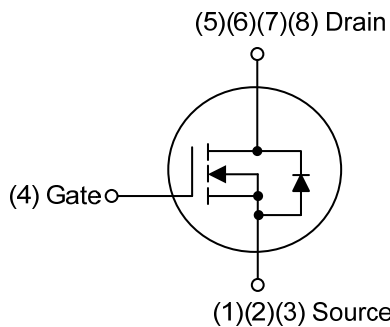
The UTC **USG085R035H-T** is suitable for high efficiency synchronous rectification in SMPS, UPS, hard switched and high frequency circuits.

#### FEATURES

\*  $R_{DS(ON)} \leq 3.5 \text{ m}\Omega @ V_{GS}=10\text{V}, I_D=50\text{A}$

\* High Switching Speed

#### SYMBOL



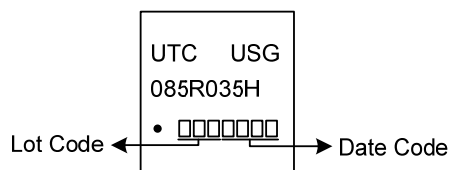
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment						Packing		
Lead Free	Halogen Free		1	2	3	4	5	6		7	8
USG085R035HL-P5060-R	USG085R035HG-P5060-R	PDFN5x6	S	S	S	G	D	D	D	D	Tape Reel

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

USG085R035HG-P5060-R (1) Packing Type (2) Package Type (3) Green Package	(1) R: Tape Reel (2) P5060: PDFN5x6 (3) G: Halogen Free and Lead Free, K: Lead Free
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#### MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	85	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Drain Current	Continuous	$I_D$	100	A
	Pulsed (Note 2)	$I_{DM}$	200	A
Single Pulsed Avalanche Energy (Note 3)		$E_{AS}$	118	mJ
Peak Diode Recovery $dv/dt$ (Note 4)		$dv/dt$	2.55	V/ns
Power Dissipation		$P_D$	100	W
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Storage Temperature Range		$T_{STG}$	-20 ~ +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.  $L = 0.1\text{mH}$ ,  $I_{AS} = 49\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\ \Omega$ , Starting  $T_J = 25^\circ\text{C}$

4.  $I_{SD} \leq 50\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		$\theta_{JA}$	65	$^\circ\text{C}/\text{W}$
Junction to Case		$\theta_{JC}$	1.25	$^\circ\text{C}/\text{W}$

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

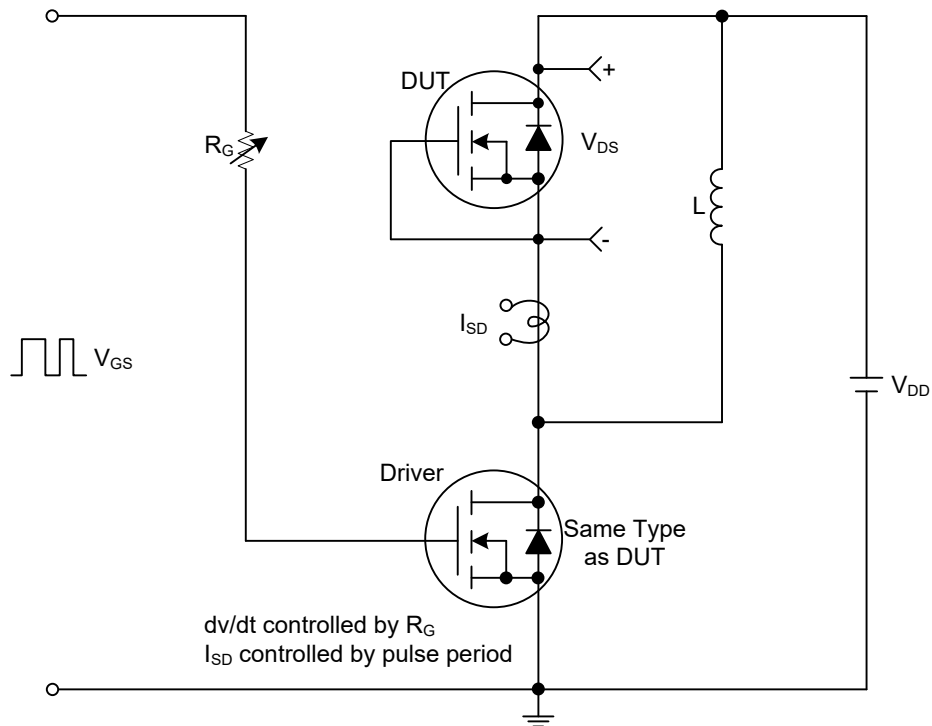
■ ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage		$BV_{DSS}$	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	85			V
Drain-Source Leakage Current		$I_{DSS}$	$V_{DS}=80\text{V}$ , $V_{GS}=0\text{V}$			1	$\mu\text{A}$
Gate-Source Leakage Current	Forward	$I_{GSS}$	$V_{GS}=+20\text{V}$ , $V_{DS}=0\text{V}$			+100	nA
	Reverse		$V_{GS}=-20\text{V}$ , $V_{DS}=0\text{V}$			-100	nA
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=50\text{A}$			3.5	m $\Omega$
<b>DYNAMIC PARAMETERS</b>							
Input Capacitance		$C_{ISS}$	$V_{GS}=0\text{V}$ , $V_{DS}=25\text{V}$ , $f=1.0\text{MHz}$		5965		pF
Output Capacitance		$C_{OSS}$			2155		pF
Reverse Transfer Capacitance		$C_{RSS}$			106		pF
<b>SWITCHING PARAMETERS</b>							
Total Gate Charge (Note 1)		$Q_G$	$V_{DS}=68\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=100\text{A}$ , (Note 1, 2)		140		nC
Gate to Source Charge		$Q_{GS}$			40		nC
Gate to Drain Charge		$Q_{GD}$			36		nC
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	$V_{DD}=40\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=100\text{A}$ , $R_G=3.3\Omega$ (Note 1, 2)		23		ns
Rise Time		$t_R$			21		ns
Turn-off Delay Time		$t_{D(OFF)}$			55		ns
Fall-Time		$t_F$			25		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>							
Maximum Body-Diode Continuous Current		$I_S$				100	A
Maximum Body-Diode Pulsed Current		$I_{SM}$				200	A
Drain-Source Diode Forward Voltage (Note 1)		$V_{SD}$	$I_S=100\text{A}$ , $V_{GS}=0\text{V}$			1.4	V
Reverse Recovery Time (Note 1)		$t_{rr}$	$I_S=30\text{A}$ , $V_{GS}=0\text{V}$ ,		66		nS
Reverse Recovery Charge		$Q_{rr}$	$dI_F/dt=85\text{A}/\mu\text{s}$		125		nC

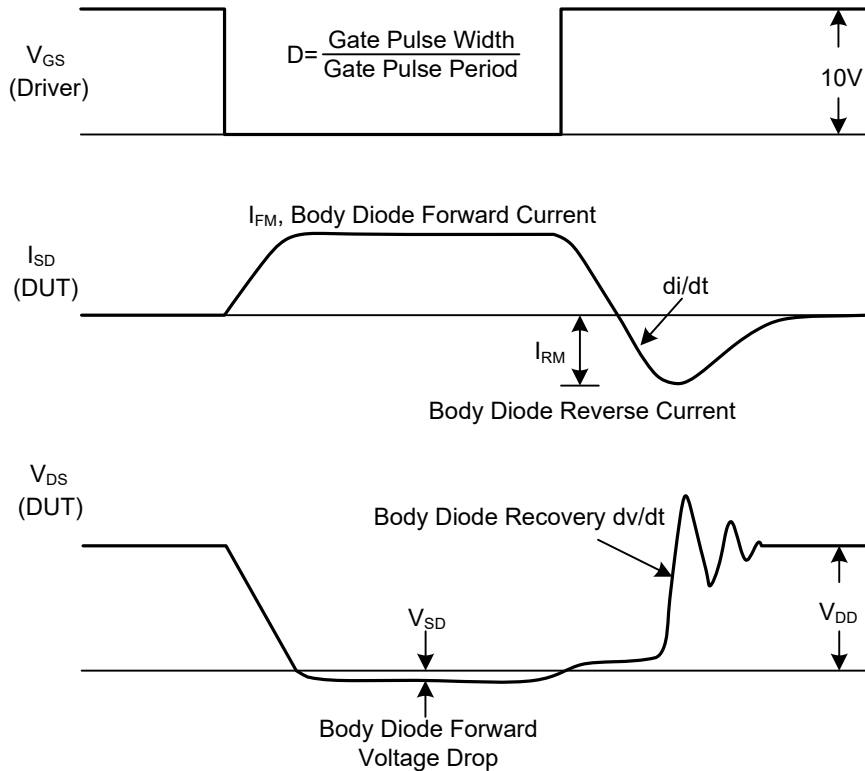
Notes: 1. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS



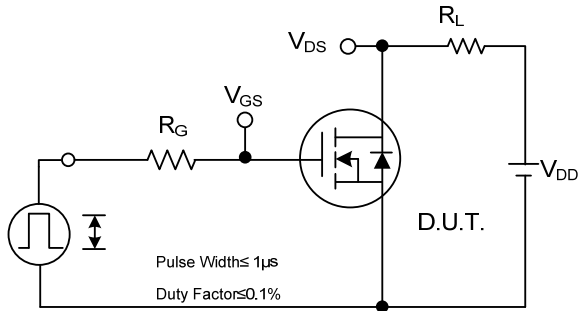
Peak Diode Recovery dv/dt Test Circuit



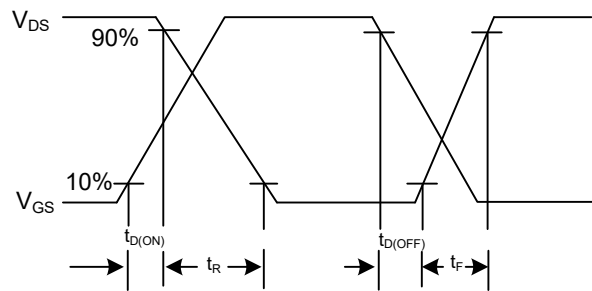
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

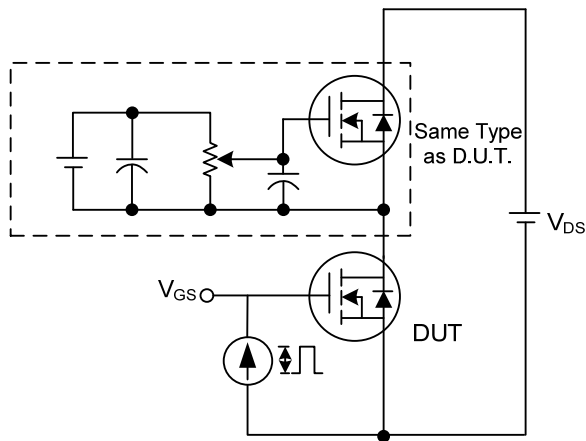
■ TEST CIRCUITS AND WAVEFORMS



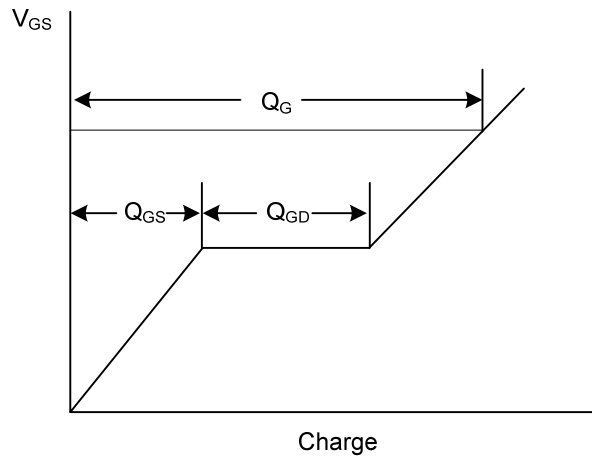
Switching Test Circuit



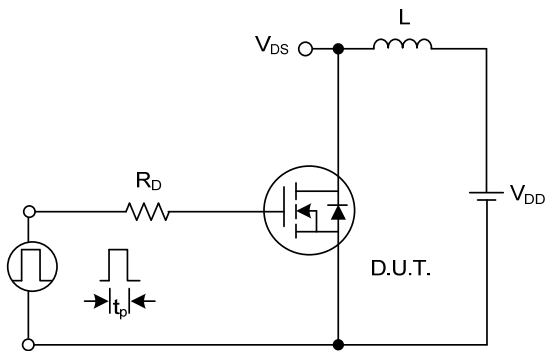
Switching Waveforms



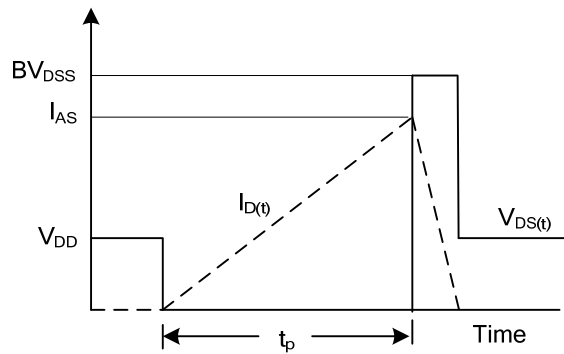
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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