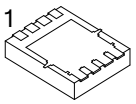
USG170N03 **Preliminary** ***POWER MOSFET***

85A, 30V N-CHANNEL ENHANCEMENT MODE TRENCH POWER MOSFET



DFN5060-8

■ DESCRIPTION

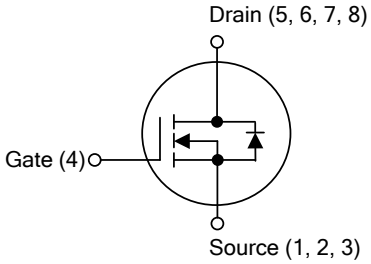
The UTC **USG170N03** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with low $R_{DS(ON)}$ characteristic by high cell density trench technology.

The UTC **USG170N03** is suitable for high efficiency synchronous rectification in SMPS, UPS, hard switched and high frequency circuits.

■ FEATURES

* $R_{DS(ON)}$ ≤ 2.64 mΩ @ V_{GS}=10V, I_D=30A
  $R_{DS(ON)}$ ≤ 4.1 mΩ @ V_{GS}=4.5V, I_D=25A
* Optimized for high speed switching, Logic level
* Enhanced Body diode dv/dt capability
* Enhanced Avalanche Ruggednessy

■ SYMBOL



■ ORDERING INFORMATION

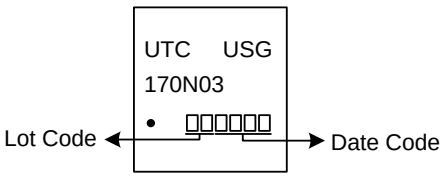
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
USG170N03L-K08-5060-R	USG170N03G-K08-5060-R	DFN5060-8	S	S	S	G	D	D	D	D	Tape Reel

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

USG170N03G-K08-5060-R

(1)Packing Type	(1) R: Tape Reel
(2)Package Type	(2) K08-5060: DFN5060-8
(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATING (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	30	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous	I_D	85	A
	Pulsed (Note 2)	I_{DM}	170	A
Avalanche Energy (Note 3)	Single Pulsed (Note 3)	E_{AS}	32	mJ
Power Dissipation		P_D	65	W
Junction Temperature		T_J	+150	°C
Storage Temperature Range		T_{STG}	-20 ~ +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}=25.4A, V_{DD}=30V, R_G = 25Ω, Starting T_J = 25°C
4. I_{SD} ≤ 20A, di/dt ≤ 200A/μs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 25°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	55	°C/W
Junction to Case	θ_{JC}	1.9	°C/W

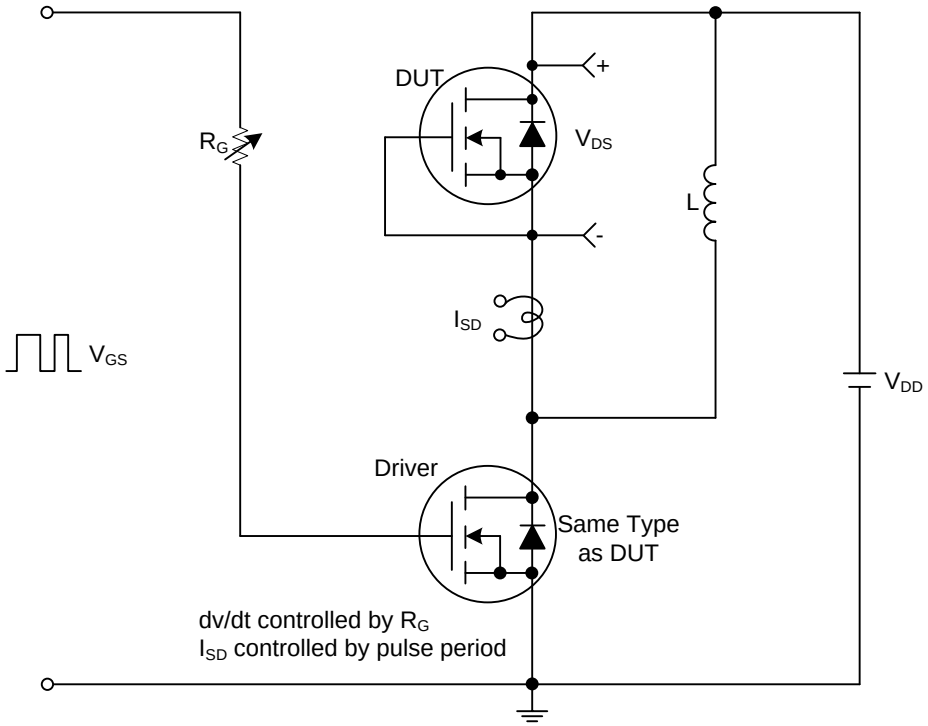
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

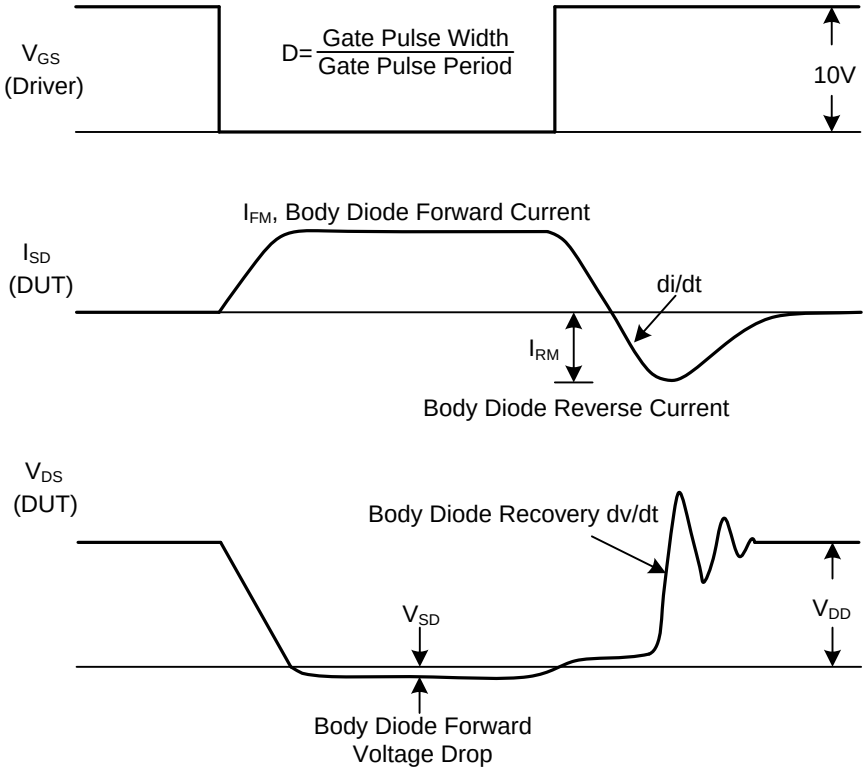
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	30			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=24V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=1mA	1.2		2.2	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=30A		2.2	2.64	mΩ
			V_{GS}=4.5V, I_D=25A		3.1	4.1	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		2600		pF
Output Capacitance		C_{OSS}			980		pF
Reverse Transfer Capacitance		C_{RSS}			65		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=24V, V_{GS}=4.5V, I_D=85A I_G=1mA (Note 1, 2)		24		nC
Gate to Source Charge		Q_{GS}			5.2		nC
Gate to Drain Charge		Q_{GD}			8.5		nC
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	V_{DS}=15V, V_{GS}=10V, I_D =85A, R_G =3.3Ω (Note 1, 2)		12		ns
Rise Time		t_R			18		ns
Turn-off Delay Time		$t_{D(OFF)}$			30		ns
Fall-Time		t_F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				85	A
Maximum Body-Diode Pulsed Current		I_{SM}				170	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=85A, V_{GS}=0V			1.4	V

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

■ TEST CIRCUITS AND WAVEFORMS



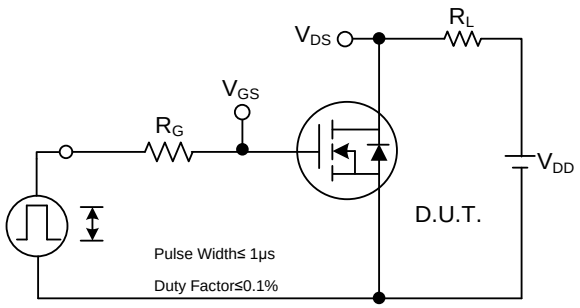
Peak Diode Recovery dv/dt Test Circuit



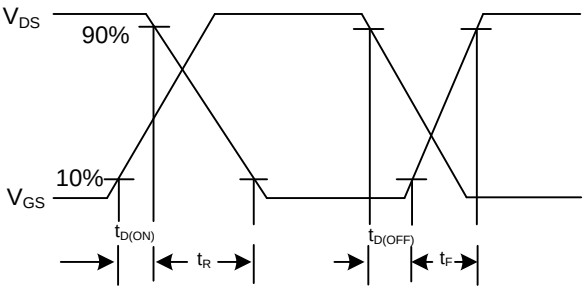
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

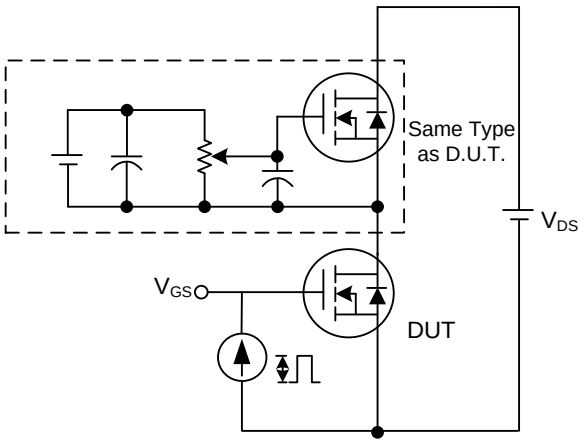
■ TEST CIRCUITS AND WAVEFORMS



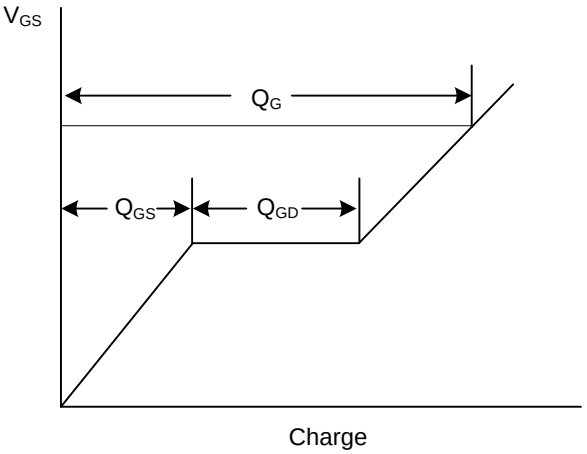
Switching Test Circuit



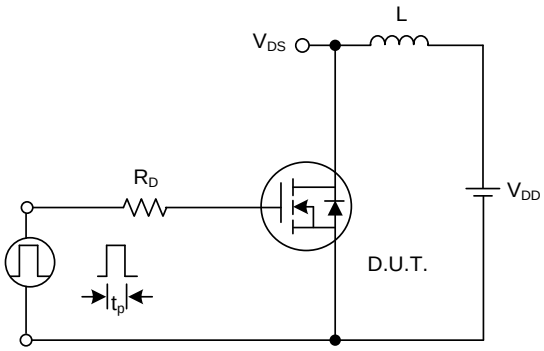
Switching Waveforms



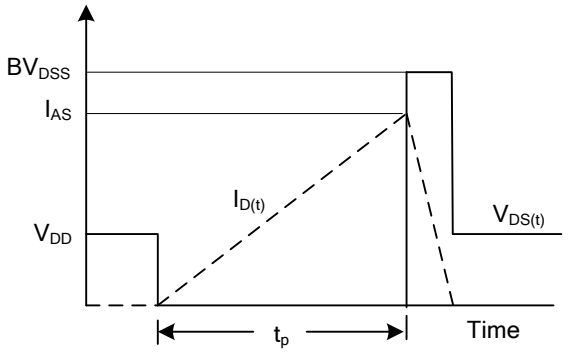
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms