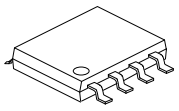
10.5A, 20V N-CHANNEL ENHANCEMENT MODE MOSFET



SOP-8

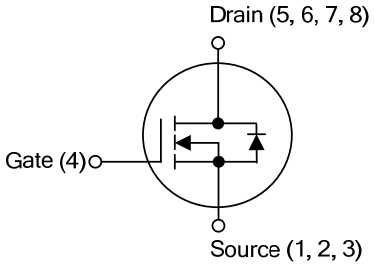
■ DESCRIPTION

The UTC **UT2013** is a N-channel Power MOSFET, designed to minimize the on-state resistance ($R_{DS(ON)}$), yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

■ FEATURES

* $R_{DS(ON)}$ ≤ 11 mΩ @ V_{GS}=4.5V, I_D=8.5A
  $R_{DS(ON)}$ ≤ 15 mΩ @ V_{GS}=2.5V, I_D=8.5A
  $R_{DS(ON)}$ ≤ 25 mΩ @ V_{GS}=1.8V, I_D=1.0A
  $R_{DS(ON)}$ ≤ 50 mΩ @ V_{GS}=1.5V, I_D=0.5A
* Low $R_{DS(ON)}$ – Ensures On-State Losses Are Minimized

■ SYMBOL



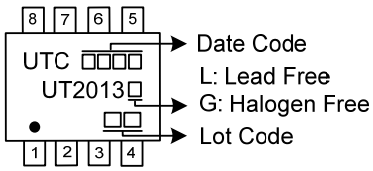
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT2013L-S08-R	UT2013G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

UT2013G-S08-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) S08: SOP-8 (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}	20	V
Gate-Source Voltage		V_{GSS}	±8	V
Drain Current	Continuous	I_D	10.5	A
	Pulsed (Note 2)	I_{DM}	21	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	50.5	mJ
Power Dissipation		P_D	1.6	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 = 0.1mH, I_{AS} = 31.8A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	90	°C/W
Junction to Case	θ_{JC}	78	°C/W

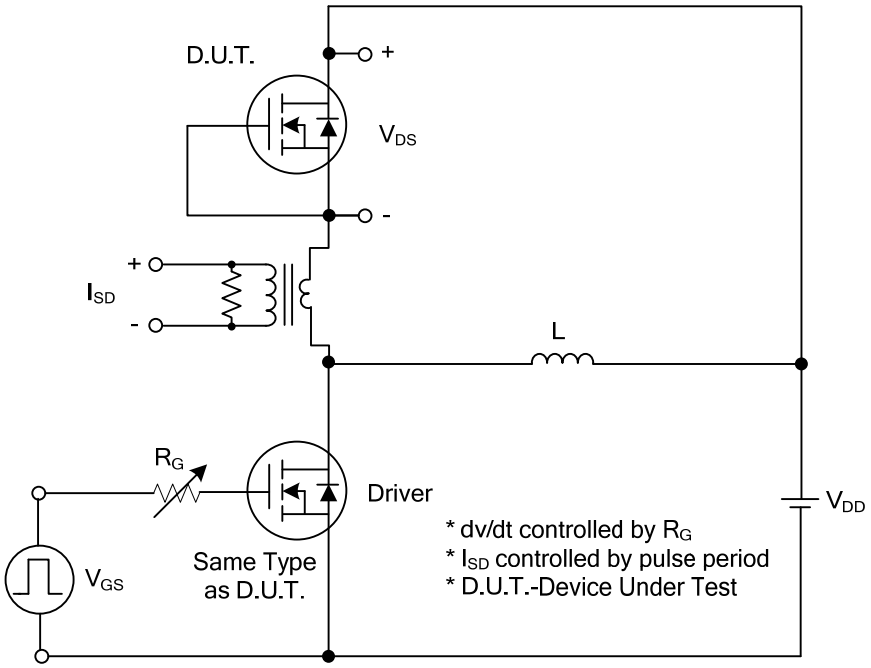
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

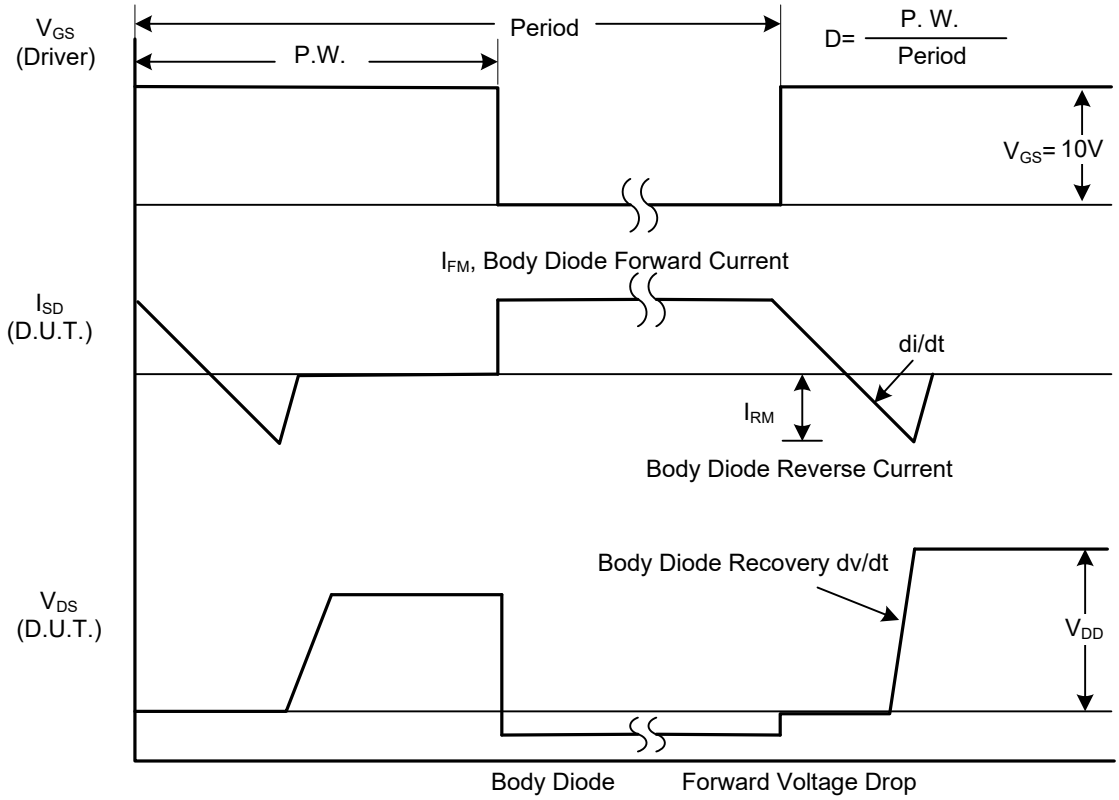
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	20			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=20V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+8V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-8V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	0.4		1.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=4.5V, I_D=8.5A			11	mΩ
			V_{GS}=2.5V, I_D=8.5A			15	mΩ
			V_{GS}=1.8V, I_D=1.0A			25	mΩ
			V_{GS}=1.5V, I_D=0.5A			50	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=15V, f=1.0MHz		900		pF
Output Capacitance		C_{OSS}			250		pF
Reverse Transfer Capacitance		C_{RSS}			216		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G (V_{GS}=8V)	V_{DS}=18V, I_D=10.5A, (Note 1, 2)		33		nC
		Q_G (V_{GS}=4.5V)			21		nC
Gate to Source Charge		Q_{GS}			2		nC
Gate to Drain Charge		Q_{GD}			10		nC
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	V_{DD}=10V, V_{GS}=4.5V, I_D=10.5A, R_G =3Ω (Note 1, 2)		5		ns
Rise Time		t_R			16		ns
Turn-off Delay Time		$t_{D(OFF)}$			27		ns
Fall-Time		t_F			23		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				10.5	A
Maximum Body-Diode Pulsed Current		I_{SM}				21	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=10.5A, V_{GS}=0V			1.4	V

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

■ TEST CIRCUITS AND WAVEFORMS



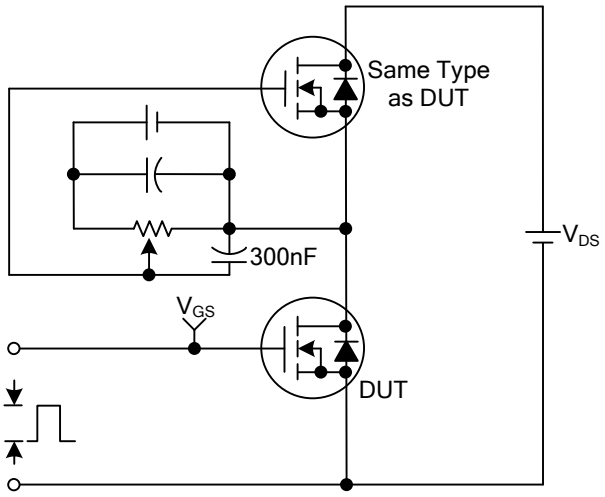
Peak Diode Recovery dv/dt Test Circuit



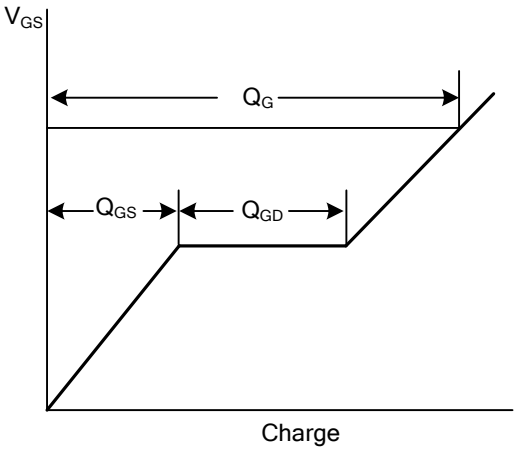
Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

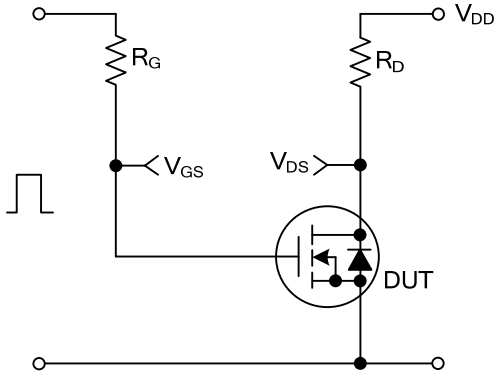
Gate Charge Test Circuit



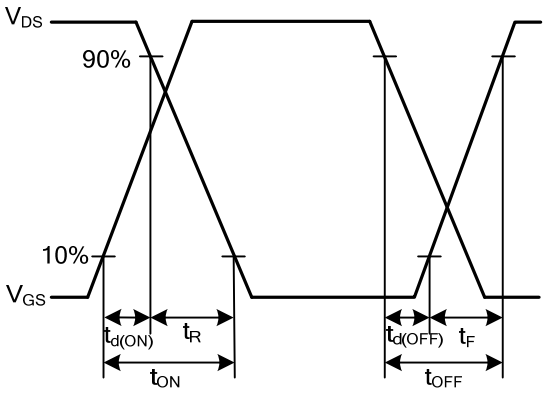
Gate Charge Waveforms



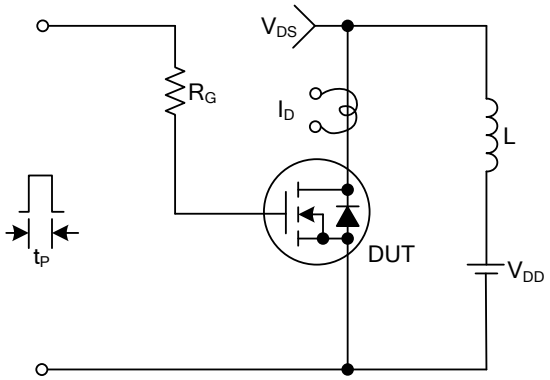
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

$$E_{AS}=\frac{1}{2}LI_{AS}^2\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$