



12A, 20V N-CHANNEL ENHANCEMENT MODE POWER MOSFET

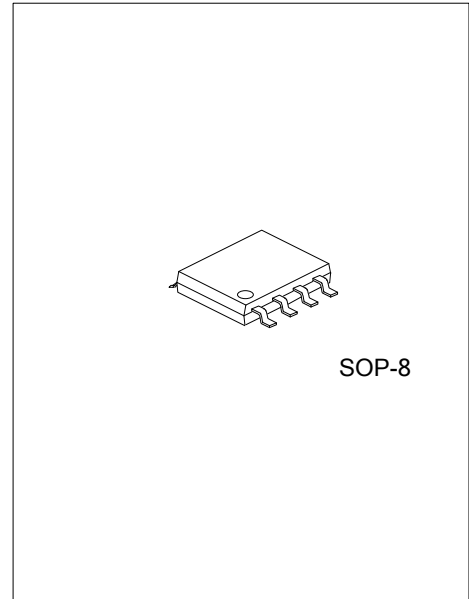
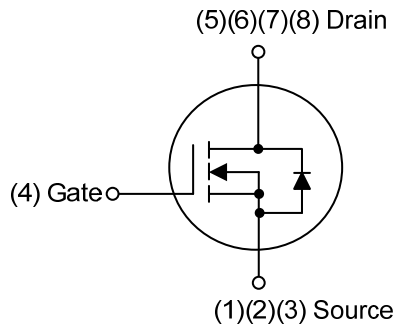
DESCRIPTION

The UTC **UT2009** is designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

FEATURES

- * $R_{DS(ON)} \leq 6.0 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=12\text{A}$
- * $R_{DS(ON)} \leq 7.1 \text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$, $I_D=10\text{A}$
- * $R_{DS(ON)} \leq 11 \text{ m}\Omega$ @ $V_{GS}=2.5\text{V}$, $I_D=8.0\text{A}$
- * Low On-Resistance
- * Low Gate Threshold Voltage
- * Low Input Capacitance
- * Fast Switching Speed
- * Low Input/Output Leakage

SYMBOL



SOP-8

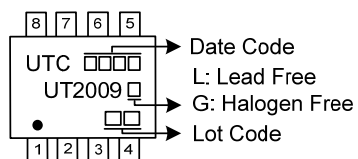
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT2009L-S08-R	UT2009G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

UT2009G-S08-R		(1) Packing Type	(1) R: Tape Reel
		(2) Package Type	(2) S08: SOP-8
		(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_{DS}	20	V
Gate-Source Voltage		V_{GS}	± 12	V
Drain Current	Continuous	I_D	12	A
	Pulsed (Note 2)	I_{DM}	24	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	182	mJ
Power Dissipation		P_D	1.7	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. $L = 1\text{mH}$, $I_{AS} = 19\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$.

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	90	$^{\circ}\text{C/W}$
Junction to Case		θ_{JC}	74	$^{\circ}\text{C/W}$

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

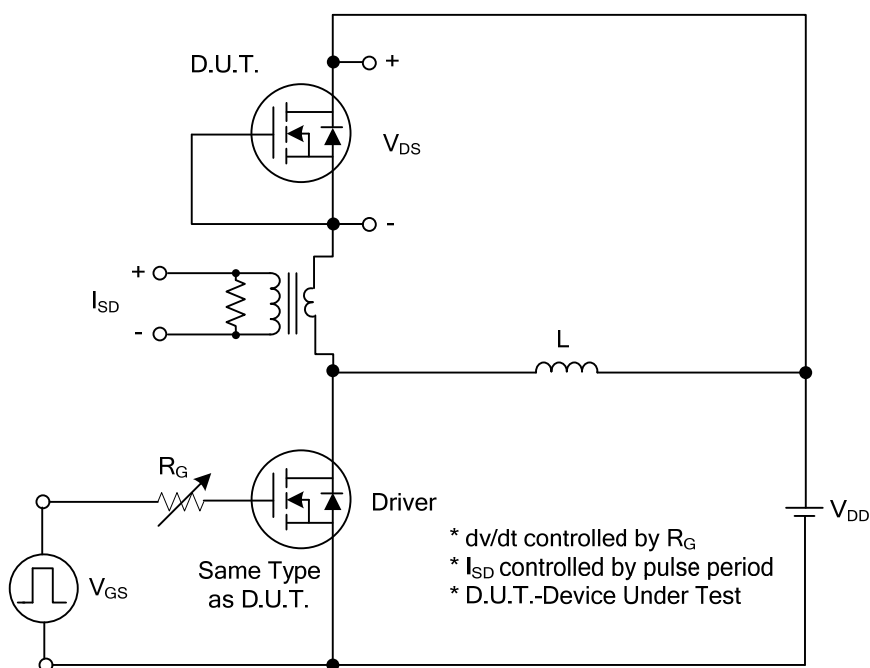
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
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} =+12V, V _{DS} =0V			+100	nA
	Reverse		V _{GS} =-12V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	0.45		1.2	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =12A			6.0	mΩ
			V _{GS} =4.5V, I _D =10A			7.1	mΩ
			V _{GS} =2.5V, I _D =8.0A			11	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =10V, f=1.0MHz		1726		pF
Output Capacitance		C _{OSS}			580		pF
Reverse Transfer Capacitance		C _{RSS}			492		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =16V, V _{GS} =10V, I _D =12A, (Note 1, 2)		61		nC
Gate to Source Charge		Q _{GS}			3		nC
Gate to Drain Charge		Q _{GD}			15		nC
Turn-on Delay Time (Note 1)		t _{D(ON)}	V _{DD} =10V, V _{GS} =10V, I _D =12A, R _G =3Ω (Note 1, 2)		8		ns
Rise Time		t _R			18		ns
Turn-off Delay Time		t _{D(OFF)}			42		ns
Fall-Time		t _F			32		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				12	A
Maximum Body-Diode Pulsed Current		I _{SM}				24	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =1.0A, V _{GS} =0V			1.2	V

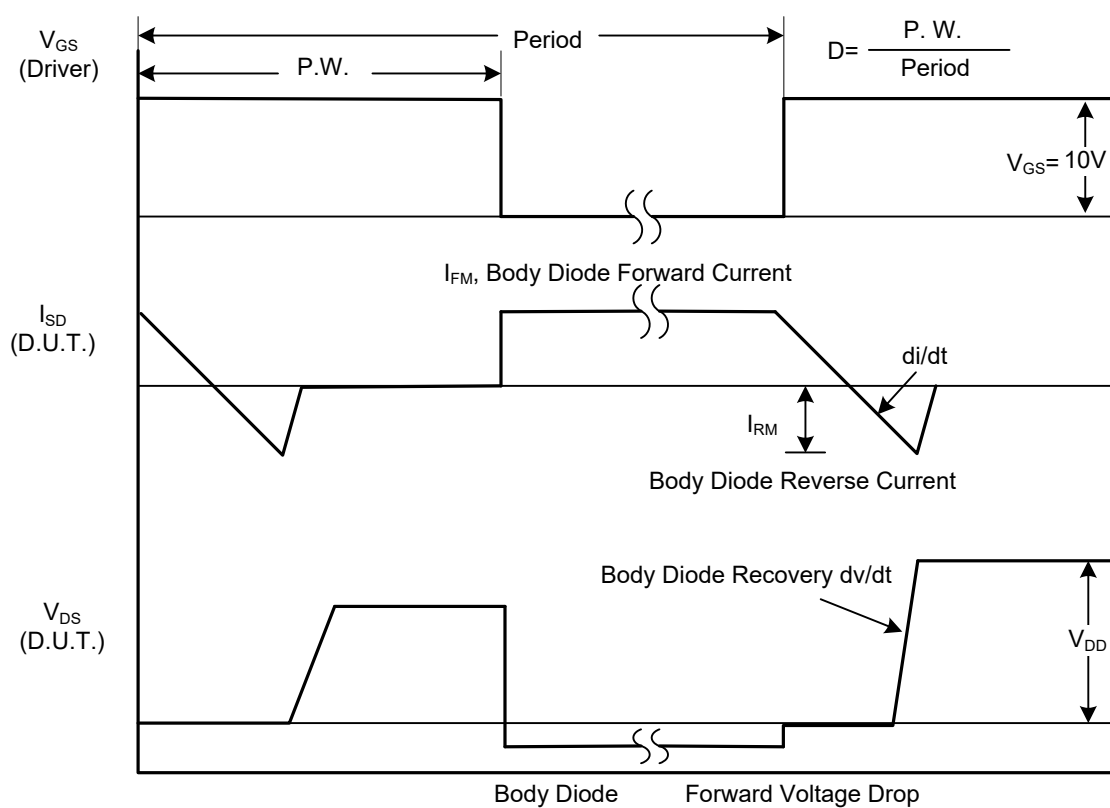
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS

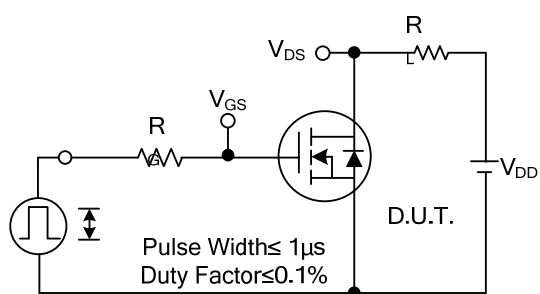


Peak Diode Recovery dv/dt Test Circuit

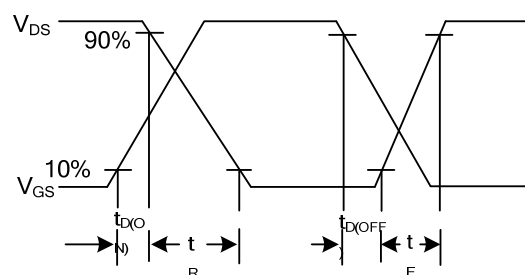


Peak Diode Recovery dv/dt Waveforms

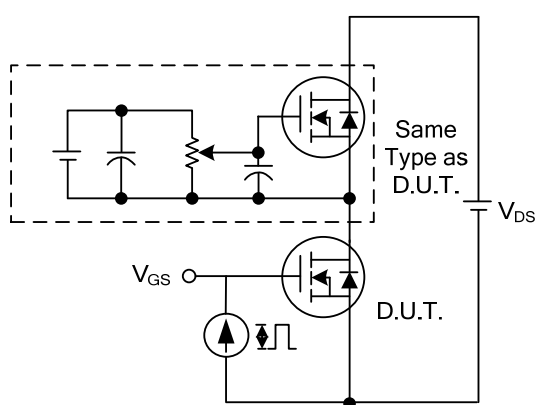
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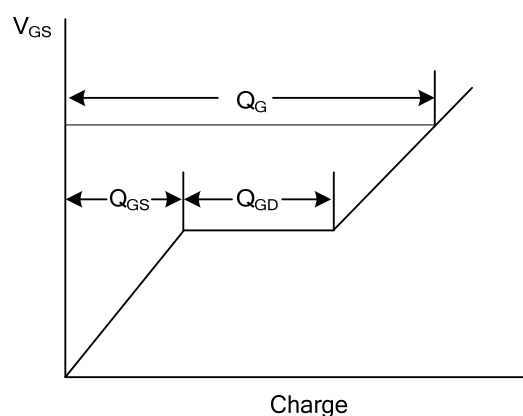
Switching Test Circuit



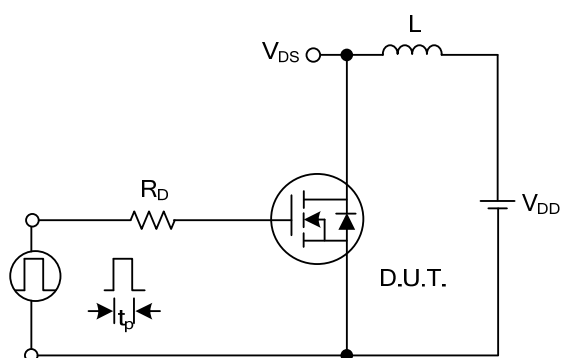
Switching Waveforms



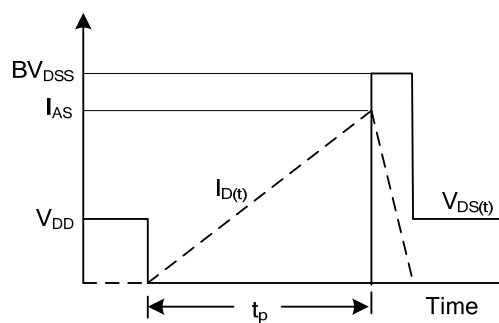
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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