



UT4409

Preliminary

Power MOSFET

-15A, -30V P-CHANNEL POWER MOSFET

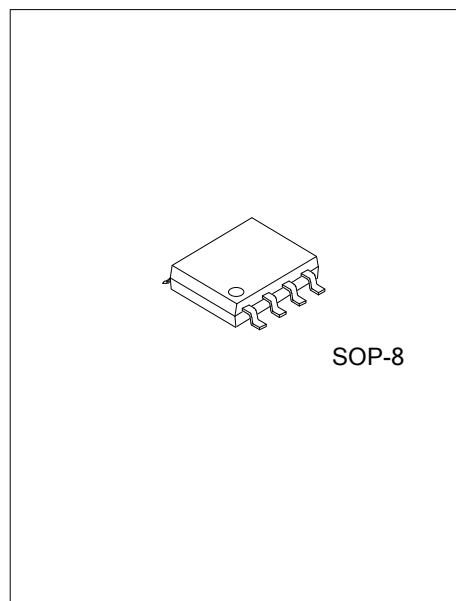
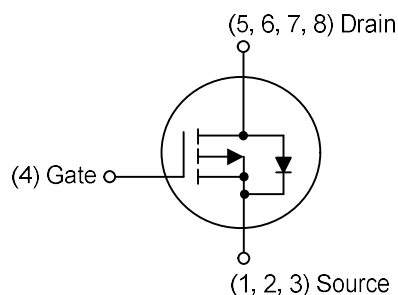
DESCRIPTION

The UTC **UT4409** provide excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

FEATURES

- * $R_{DS(ON)} \leq 6.0 \text{ m}\Omega$ @ $V_{GS} = -10\text{V}$, $I_D = -15\text{A}$
- $R_{DS(ON)} \leq 10 \text{ m}\Omega$ @ $V_{GS} = -4.5\text{V}$, $I_D = -10\text{A}$
- * 100% Avalanche Tested

SYMBOL



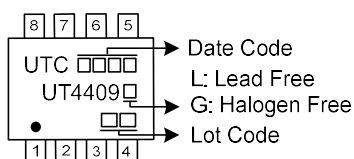
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT4409L-S08-R	UT4409G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

UT4409G-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 RATINGS** ($T_C=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V _{DSS}	-30	V
Gate-Source Voltage			V _{GSS}	±25	V
Drain Current	Continuous, V _{GSS} @ -10V	T _C =25°C	I _D	-15	A
		T _C =100°C		-12.8	A
	Pulsed (Note 2)		I _{DM}	-60	A
Avalanche Energy	Repetitive (Note 3)		E _{AS}	176	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	0.6	V/ns
Power Dissipation (T _C =25°C)			P _D	55	W
Junction Temperature			T _J	+150	°C
Storage Temperature			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. $L = 0.1\text{mH}$, $I_{AS} = -59.3\text{A}$, $V_{DD} = -30\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD} \leq -30\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ **THERMAL DATA**

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	50	$^{\circ}\text{C}/\text{W}$
Junction to Case	θ_{JC}	2.27	$^{\circ}\text{C}/\text{W}$

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

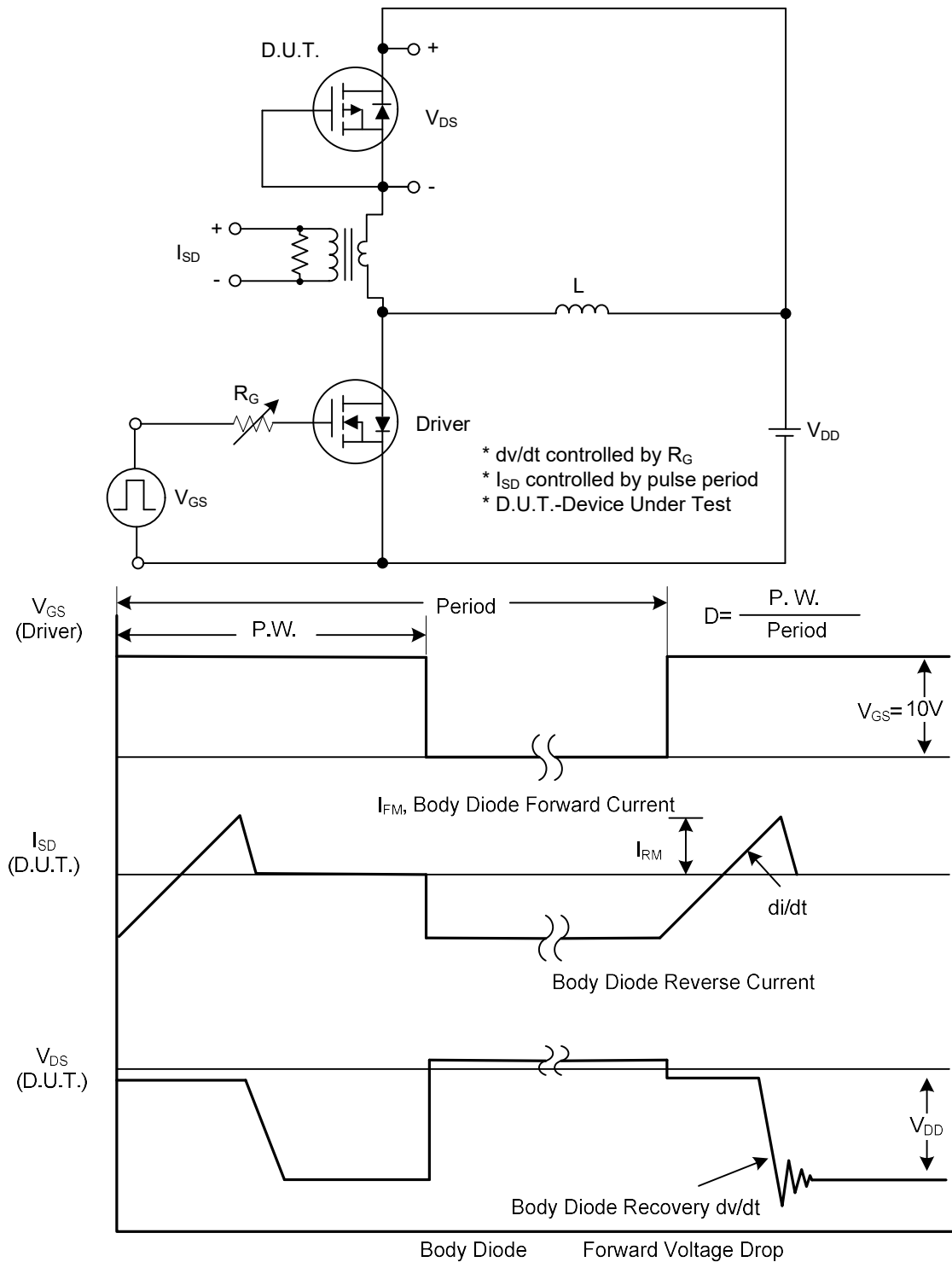
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =-250μA, V _{GS} =0V	-30			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =-30V, 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	-1.0		-3.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =-10V, I _D =-15A			6.0	mΩ
			V _{GS} =-4.5V, I _D =-10A			10	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{DS} =-25V, V _{GS} =0V, f=1MHz		5309		pF
Output Capacitance		C _{OSS}			792		pF
Reverse Transfer Capacitance		C _{RSS}			625		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =-24V, V _{GS} =-10V, I _D =-15A (Note 1, 2)		90		nC
Gate to Source Charge		Q _{GS}			9		nC
Gate to Drain ("Miller") Charge		Q _{GD}			7		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =-15V, V _{GS} =-10V, I _D =-15A, R _G =3Ω (Note 1, 2)		14		ns
Rise Time		t _R			19		ns
Turn-OFF Delay Time		t _{D(OFF)}			129		ns
Fall-Time		t _F			87		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				-15	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =-15A, V _{GS} =0V(Note 1, 2)			-1.4	V
Body Diode Reverse Recovery Time (Note 1)		t _{rr}	I _S =-30A, V _{GS} =0V,		176		ns
Body Diode Reverse Recovery Charge		Q _{rr}	dI _F /dt=100A/μs		602		nC

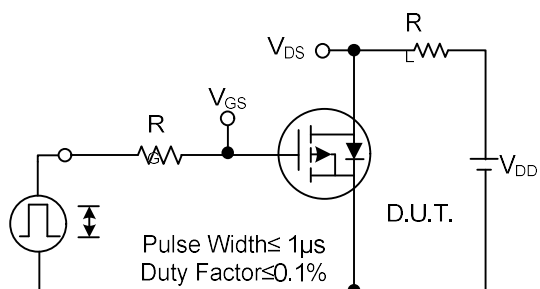
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

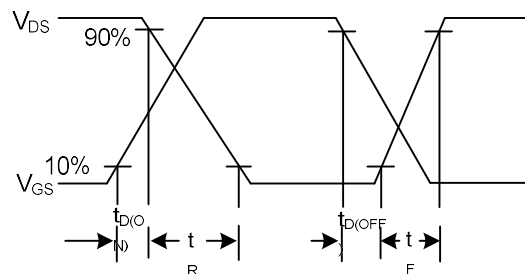
■ TEST CIRCUITS AND WAVEFORMS



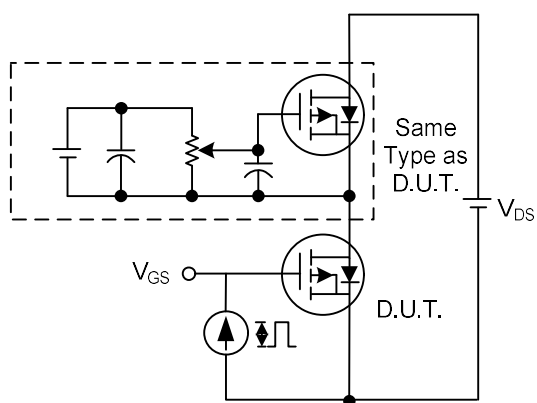
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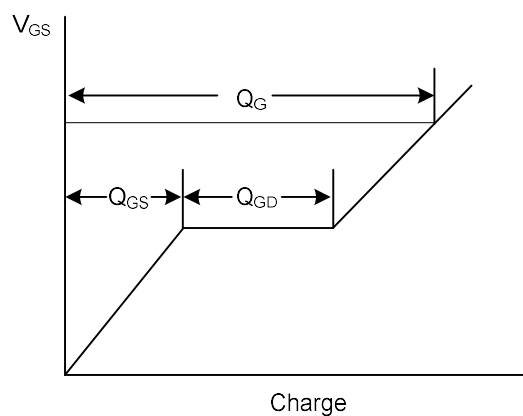
Switching Test Circuit



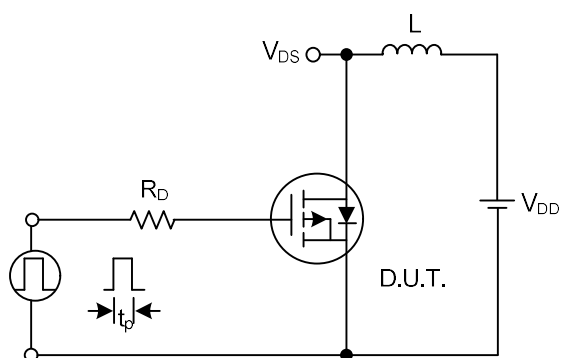
Switching Waveforms



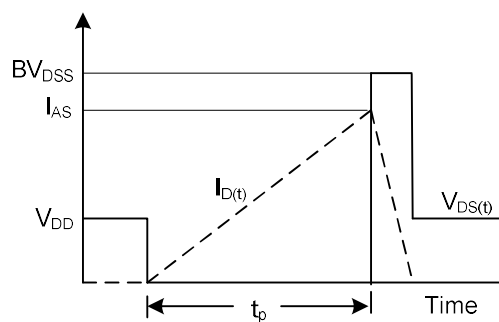
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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