



UT4N10

Preliminary

Power MOSFET

4A, 100V N-CHANNEL ENHANCEMENT MODE POWER MOSFET

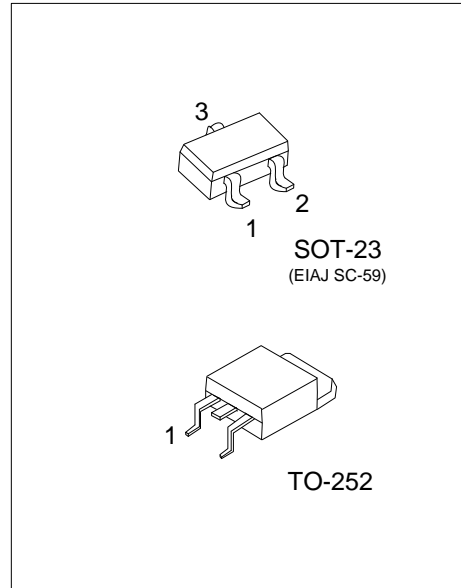
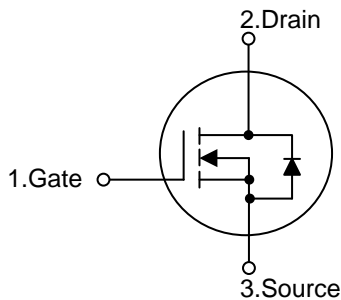
DESCRIPTION

The UTC **UT4N10** is a N-channel power MOSFET providing very low on-resistance. It has high efficiency and perfect cost-effectiveness. It can be generally applied in the commercial and industrial fields.

FEATURES

- * $R_{DS(ON)} \leq 140 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=2.0\text{A}$
- $R_{DS(ON)} \leq 160 \text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$, $I_D=2.0\text{A}$
- * Simple drive requirement

SYMBOL



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen-Free		1	2	3	
UT4N10L-AE3-R	UT4N10G-AE3-R	SOT-23	S	G	D	Tape Reel
UT4N10L-TN3-R	UT4N10G-TN3-R	TO-252	G	D	S	Tape Reel

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

	<p>(1) R: Tape Reel</p> <p>(2) AE3: SOT-23, TN3: TO-252</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING

SOT-223	SOT-89

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	100	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current	Continuous	I_D	4	A
	Pulsed (Note 2)	I_{DM}	8	A
Avalanche Energy (Note 3)	Single Pulsed (Note 3)	E_{AS}	9.9	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.4	V/ns
Power Dissipation	SOT-223	P_D	0.8	W
	TO-252		35	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. $L = 0.5\text{mH}$, $I_{AS} = 4.4\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$.

4. $I_{SD} \leq 4.0\text{A}$, $di/dt \leq 100\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_J = 25^{\circ}\text{C}$.

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

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	SOT-223	θ_{JA}	140 (Note)	$^{\circ}\text{C}/\text{W}$
	TO-252		110 (Note)	$^{\circ}\text{C}/\text{W}$

Note: Surface mounted on 1 in² copper pad of FR4 board; 270 $^{\circ}\text{C}/\text{W}$ when mounted on min. copper pad.

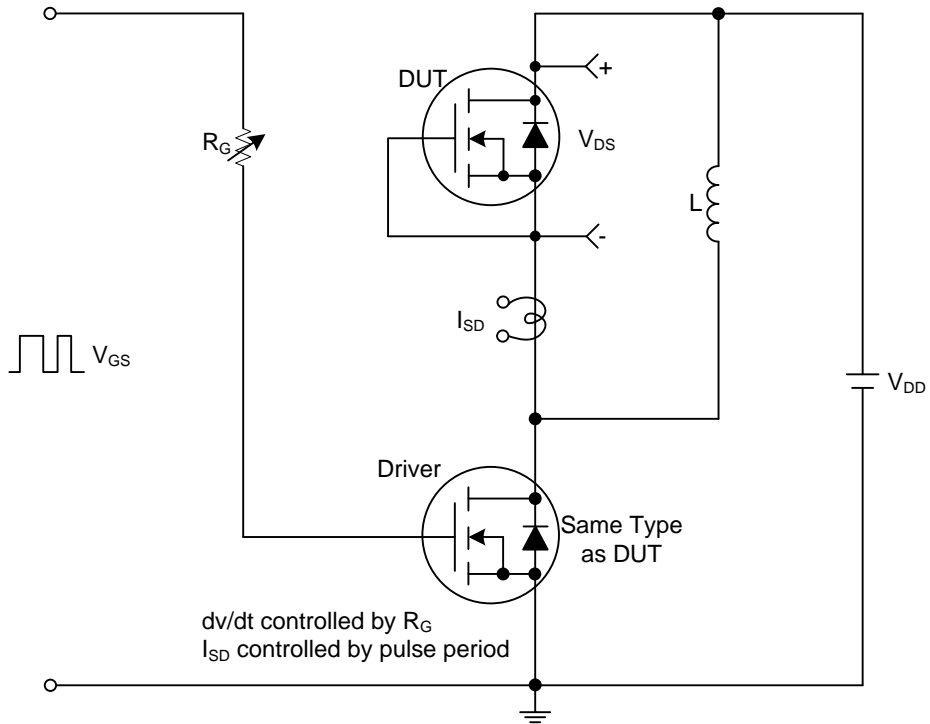
ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	100			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=100V, V_{GS}=0V$			1	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0		3.0	V
Drain to Source On-state Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2.0A$			140	$m\Omega$
		$V_{GS}=4.5V, I_D=2.0A$			160	$m\Omega$
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1.0MHz$		590		pF
Output Capacitance	C_{OSS}			42		pF
Reverse Transfer Capacitance	C_{RSS}			32		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=80V, V_{GS}=10V, I_D=4.0A, I_G=1mA$ (Note 1, 2)		16		nC
Gate Source Charge	Q_{GS}			2.6		nC
Gate Drain Charge	Q_{GD}			2		nC
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$	$V_{DD}=15V, V_{GS}=10V, I_D=4.0A, R_G=25\Omega$ (Note 1, 2)		5		ns
Turn-ON Rise Time	t_R			17		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			20		ns
Turn-OFF Fall-Time	t_F			18		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				4	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				8	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_S=4.0A, V_{GS}=0V$			1.4	V
Reverse Recovery Time (Note 1)	t_{rr}	$I_S=4.0A, V_{GS}=0V,$		52		ns
Reverse Recovery Charge	Q_{rr}	$dI/dt=100A/\mu s$		98		nC

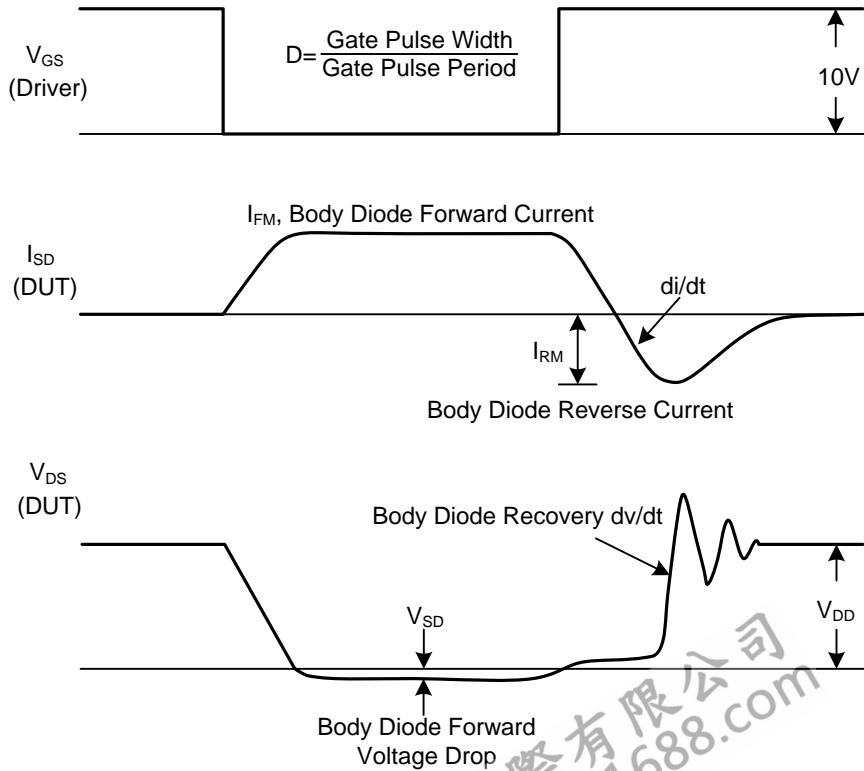
Notes: 1. Pulse Test : Pulse width $\leq 1000\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS



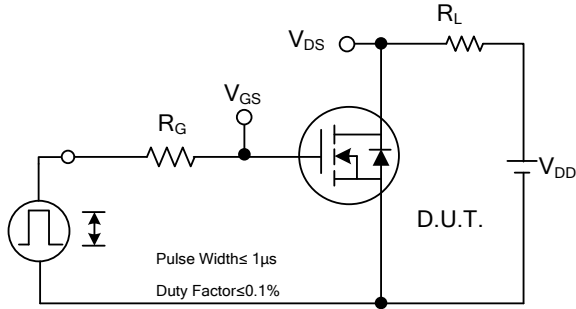
Peak Diode Recovery dv/dt Test Circuit



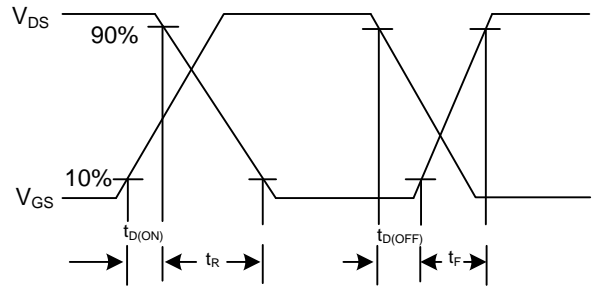
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

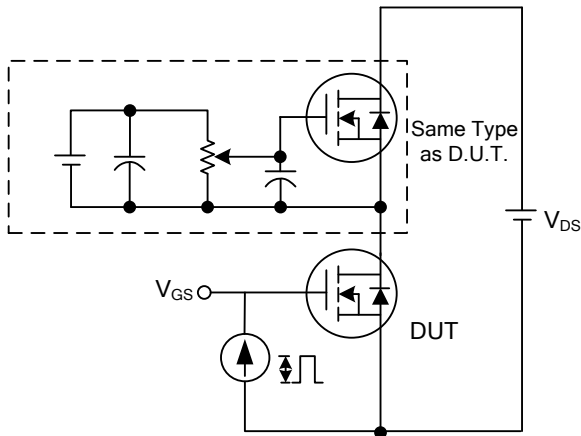
■ TEST CIRCUITS AND WAVEFORMS



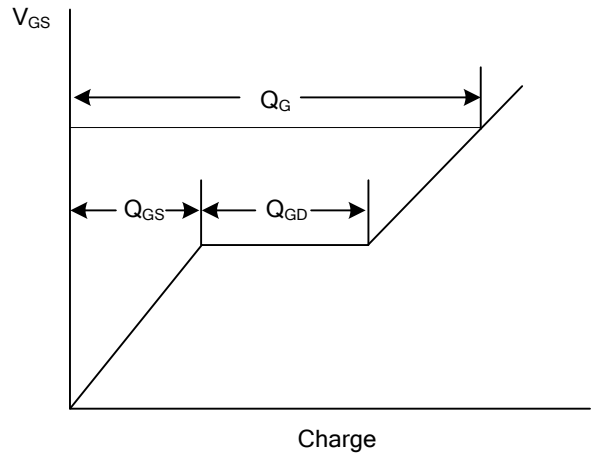
Switching Test Circuit



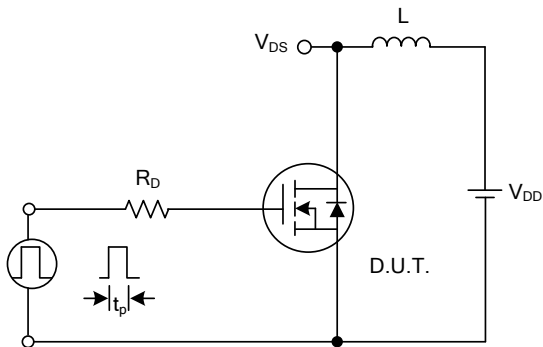
Switching Waveforms



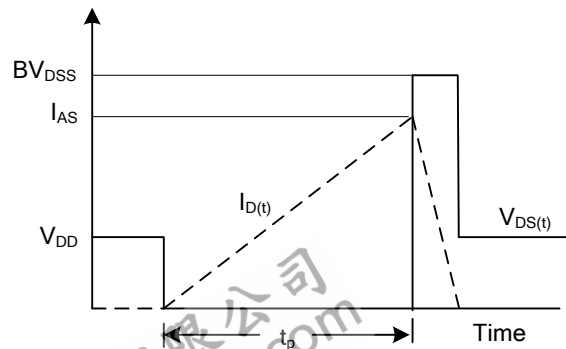
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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