



UT4P04M

Preliminary

POWER MOSFET

-4.0A, -40V P-CHANNEL POWER MOSFET

DESCRIPTION

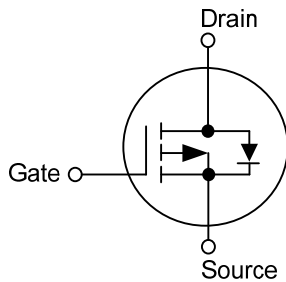
The UTC **UT4P04M** is a P-channel MOS Field Effect Transistor. it uses UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance.

The UTC **UT4P04M** is suitable for high voltage switching applications.

FEATURES

- * $R_{DS(ON)} \leq 110 \text{ m}\Omega$ @ $V_{GS} = -10V$, $I_D = -2.0A$
- $R_{DS(ON)} \leq 150 \text{ m}\Omega$ @ $V_{GS} = -4.5V$, $I_D = -2.0A$
- * High switching speed
- * Low input capacitance

SYMBOL

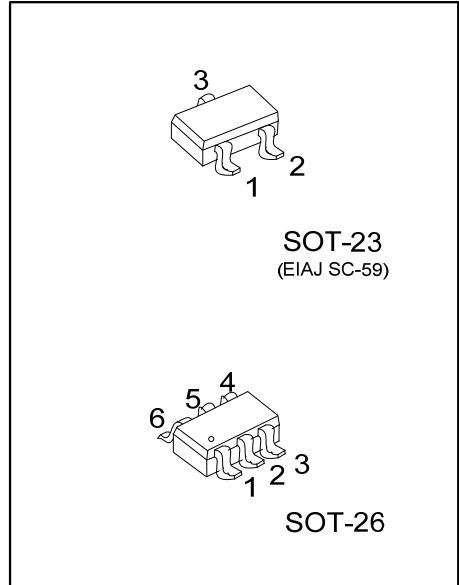


ORDERING INFORMATION

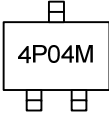
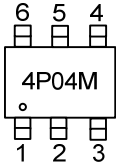
Ordering Number		Package	Pin Assignment						Packing
Lead Free	Halogen Free		1	2	3	4	5	6	
UT4P04ML-AE3-R	UT4P04MG-AE3-R	SOT-23	G	S	D	-	-	-	Tape Reel
UT4P04ML-AG6-R	UT4P04MG-AG6-R	SOT-26	D	D	G	S	D	D	Tape Reel

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

UT4P04MG-AE3-R		(1)Packing Type	(1) R: Tape Reel
		(2)Package Type	(2) AE3: SOT-23, AG6: SOT-26
		(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free



■ MARKING

SOT-23	SOT-26
 A diagram of a SOT-23 package. It is a small rectangle with the text "4P04M" in the center. There are three pins: one at the top and two at the bottom.	 A diagram of a SOT-26 package. It is a rectangle with the text "4P04M" in the center. There are six pins: three on the top edge (labeled 6, 5, 4 from left to right) and three on the bottom edge (labeled 1, 2, 3 from left to right). A small circle is located on the left side of the package.

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	-40	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current	DC	I_D	-4	A
	Pulsed (Note 2)	I_{DM}	-8	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	6.25	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.4	V/ns
Power Dissipation ($T_A=25^{\circ}\text{C}$)	SOT-23	P_D	0.73	W
	SOT-26		0.75	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. $L = 0.5\text{mH}$, $I_{AS} = -5.0\text{A}$, $V_{DD} = -25\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD} \leq -4.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-23	θ_{JA}	170 (Note)	$^{\circ}\text{C}/\text{W}$
	SOT-26		166 (Note)	$^{\circ}\text{C}/\text{W}$

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

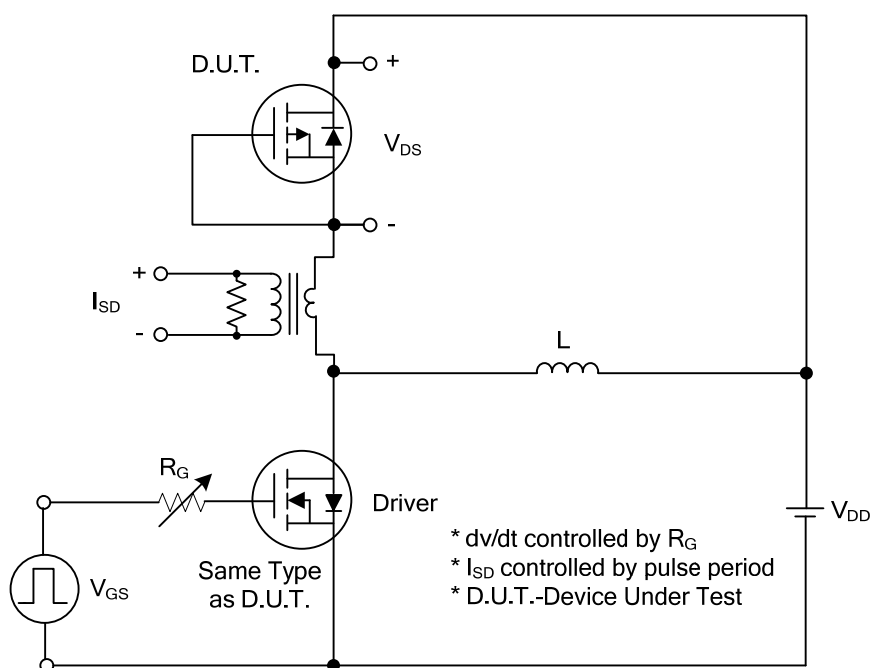
■ ELECTRICAL CHARACTERISTICS (T_J=25°C unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =-250μA	-40			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =-40V, 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 =-2.0A			110	mΩ
			V _{GS} =-4.5V, I _D =-2.0A			150	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =-25V, f=1.0MHz		380		pF
Output Capacitance		C _{OSS}			50		pF
Reverse Transfer Capacitance		C _{RSS}			40		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =-32V, V _{GS} =-10V, I _D =-4.0A, (Note 1, 2)		14		nC
Gate to Source Charge		Q _{GS}			2		nC
Gate to Drain Charge		Q _{GD}			3		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DS} =-20V, V _{GS} =-10V, I _D =-4.0A, R _G =3Ω (Note 1, 2)		3		ns
Rise Time		t _R			18		ns
Turn-OFF Delay Time		t _{D(OFF)}			16		ns
Fall-Time		t _F			20		ns
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				-4	A
Diode Forward Voltage		V _{SD}	I _F =-4.0A, V _{GS} =0V			-1.4	V
Body Diode Reverse Recovery Time		t _{rr}	I _F =-4.0A, V _{GS} =0V, di/dt=100A/μs		54		ns
Body Diode Reverse Recovery Charge		Q _{rr}			38		nC

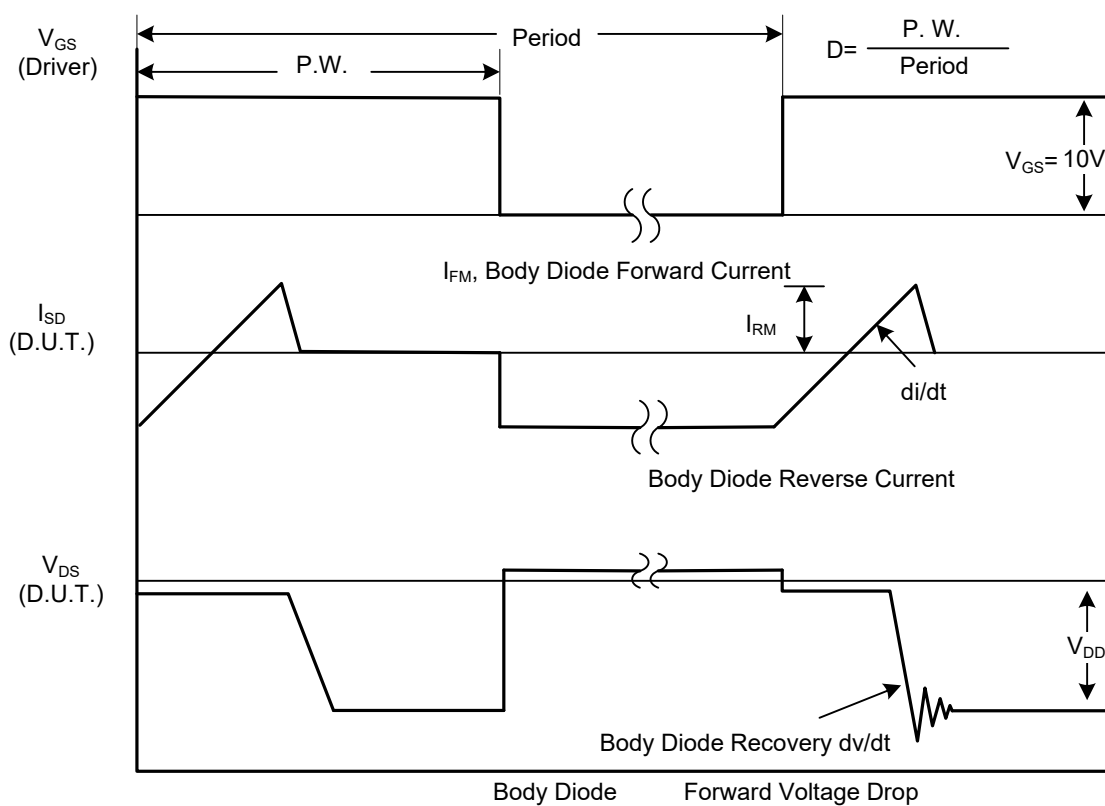
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

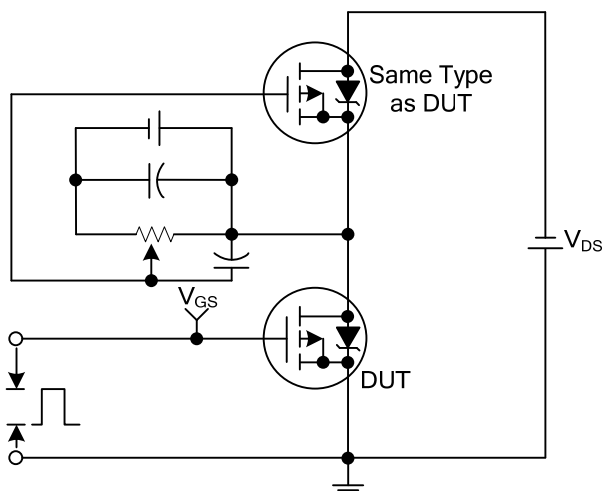


Peak Diode Recovery dv/dt Test Circuit

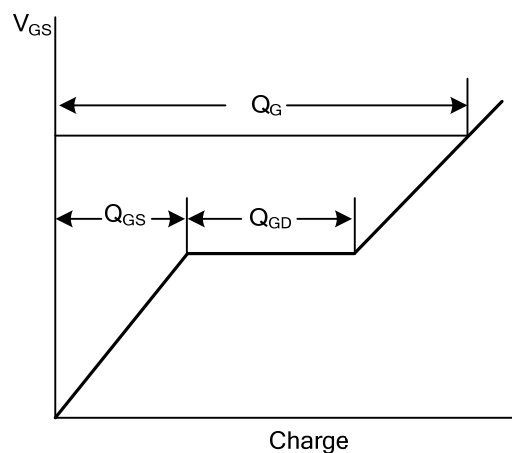


Peak Diode Recovery dv/dt Waveforms

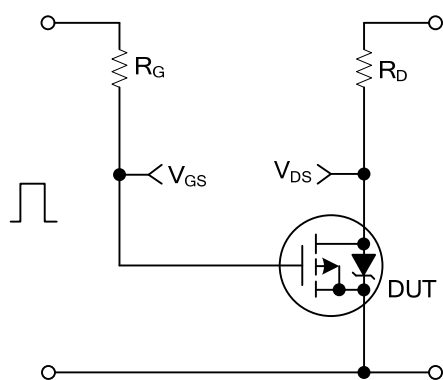
■ TEST CIRCUITS AND WAVEFORMS



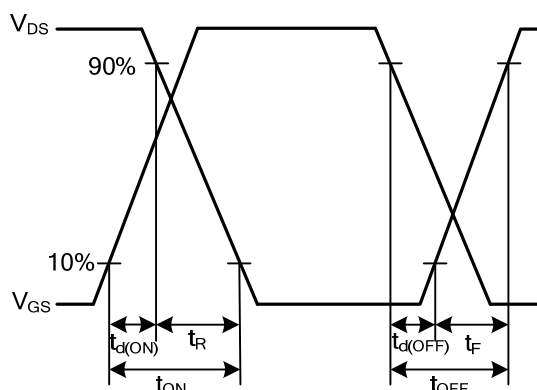
Gate Charge Test Circuit



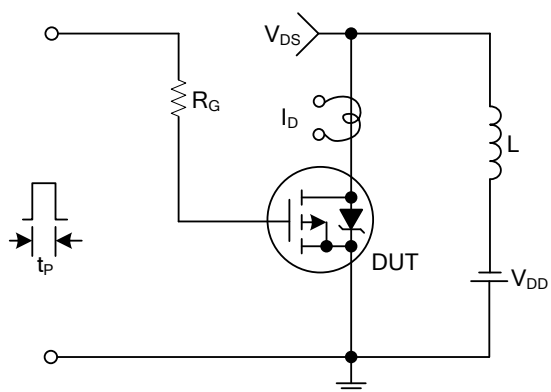
Gate Charge Waveforms



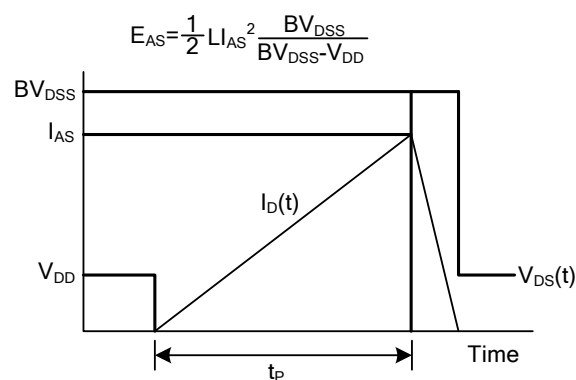
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.