



UTT40P04

Power MOSFET

-50A, -40V P-CHANNEL POWER MOSFET

■ **DESCRIPTION**

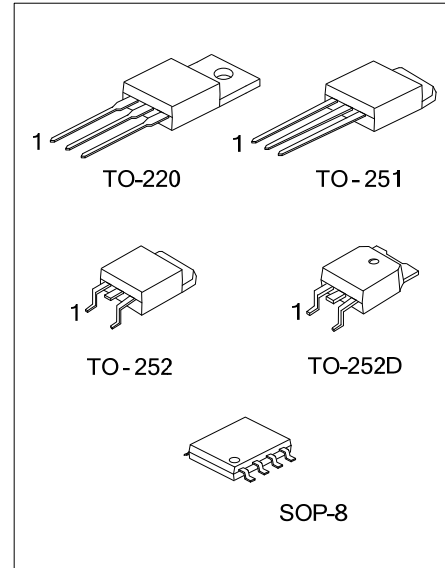
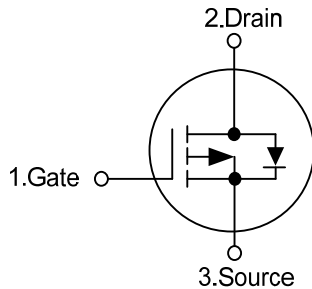
The UTC **UTT40P04** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance. It can also withstand high energy in the avalanche.

This UTC **UTT40P04** is suitable for Inverter or Power supplies.

■ **FEATURES**

- * $R_{DS(ON)} < 20m\Omega @ V_{GS}=-10V, I_D=-12.7A,$
- $R_{DS(ON)} < 30 m\Omega @ V_{GS}=-4.5V, I_D=-10.4A$

■ **SYMBOL**



■ **ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment								Packing	
Lead Free	Halogen Free		1	2	3	4	5	6	7	8		
UTT40P04L-TA3-T	UTT40P04G-TA3-T	TO-220	G	D	S	-	-	-	-	-	-	Tube
UTT40P04L-TM3-T	UTT40P04G-TM3-T	TO-251	G	D	S	-	-	-	-	-	-	Tube
UTT40P04L-TN3-R	UTT40P04G-TN3-R	TO-252	G	D	S	-	-	-	-	-	-	Tape Reel
UTT40P04L-TND-R	UTT40P04G-TND-R	TO-252D	G	D	S	-	-	-	-	-	-	Tape Reel
UTT40P04L-S08-R	UTT40P04G-S08-R	SOP-8	S	S	S	G	D	D	D	D	D	Tape Reel

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

<p>UTT40P04G-TA3-T</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TM3: TO-251, TN3: TO-252, TND: TO-252D, S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ **MARKING**

TO-220 / TO-251 / TO-252 / TO-252D	SOP-8

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	-40	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current	Continuous	Package limited	-50	A
		Silicon limited	-58	A
	Pulsed	I_{DM}	-100	A
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	337	mJ
Power Dissipation	$T_C=25^\circ\text{C}$	TO-220	125	W
		TO-251/TO-252	55	W
		TO-252D		
		SOP-8	3.4	W
	$T_A=25^\circ\text{C}$	TO-220	2	W
		TO-251/TO-252	1.1	W
		TO-252D		
		SOP-8	1.6	W
Junction Temperature		T_J	-55 ~ +150	$^\circ\text{C}$
Storage Temperature		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. Starting $T_J = 25^\circ\text{C}$, $L = 3\text{mH}$, $I_{AS} = 15\text{A}$, $V_{DD} = 40\text{V}$, $V_{GS} = 10\text{V}$.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	$^\circ\text{C/W}$
	TO-251/TO-252		110	$^\circ\text{C/W}$
	TO-252D			
	SOP-8		75 (Note)	$^\circ\text{C/W}$
Junction to Case	TO-220	θ_{JC}	1	$^\circ\text{C/W}$
	TO-251/TO-252		2.27	$^\circ\text{C/W}$
	TO-252D			
	SOP-8		36.7	$^\circ\text{C/W}$

Note: The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ\text{C}$. The value in any given application depends on the user's specific board design. The current rating is based on the $t \leq 10\text{s}$ thermal resistance rating.

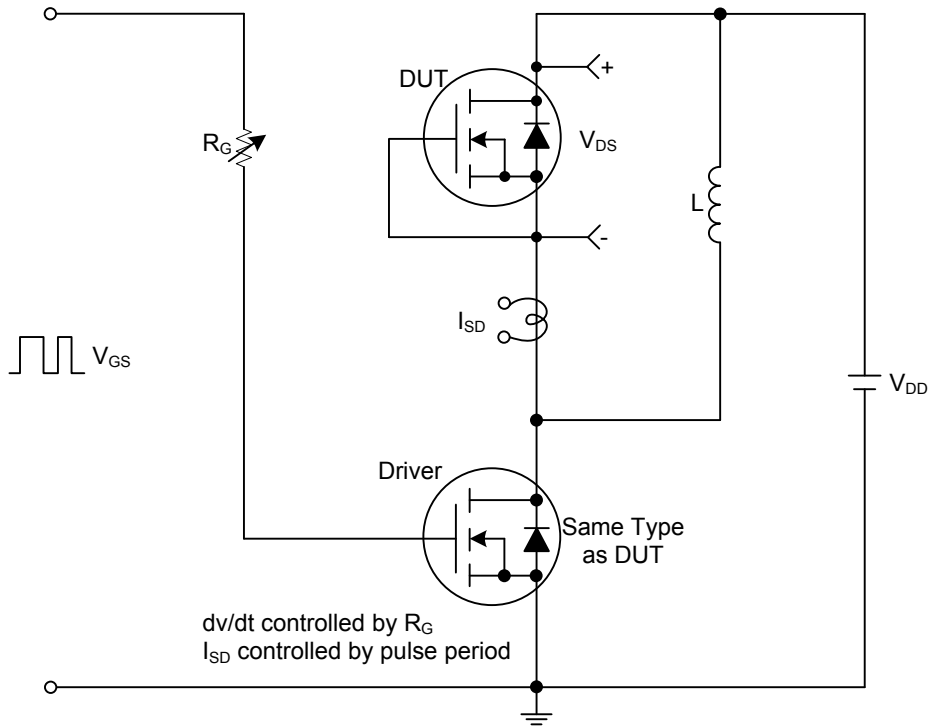
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =-250μA, V _{GS} =0V	-40			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =-32V, V _{GS} =0V			-1	μA
Gate- Source Leakage Current	Forward	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	-1.8	-3	V
Static Drain-Source On-State Resistance	R _{Ds(ON)}	V _{GS} =-10V, I _D =-12.7A		17	20	mΩ
		V _{GS} =-4.5V, I _D =-10.4A		24	30	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =-20V, f=1.0MHz		2085	2775	pF
Output Capacitance	C _{OSS}			360	480	pF
Reverse Transfer Capacitance	C _{RSS}			210	310	pF
Gate Resistance	R _G	f=1.0MHz		4.6		Ω
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{GS} =0~-10V, V _{DD} =-20V, I _D =-12.7A		230		nC
		V _{GS} =0~-5V, V _{DD} =-20V, I _D =-12.7A		120		nC
Gate to Source Charge	Q _{GS}	V _{DD} =-20V, I _D =-12.7A		17		nC
Gate to Drain Charge	Q _{GD}			21		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =-20V, I _D =-12.7A, R _{GEN} =6Ω, V _{GS} =-10V		36		ns
Rise Time	t _R			76		ns
Turn-OFF Delay Time	t _{D(OFF)}			600		ns
Fall-Time	t _F			380		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V _{SD}	I _S =-12.7A, V _{GS} =0V (Note 1)		-0.8	-1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F =-12.7A, di/dt=100A/μs		29	44	ns
Body Diode Reverse Recovery Charge	Q _{rr}			26	40	μC

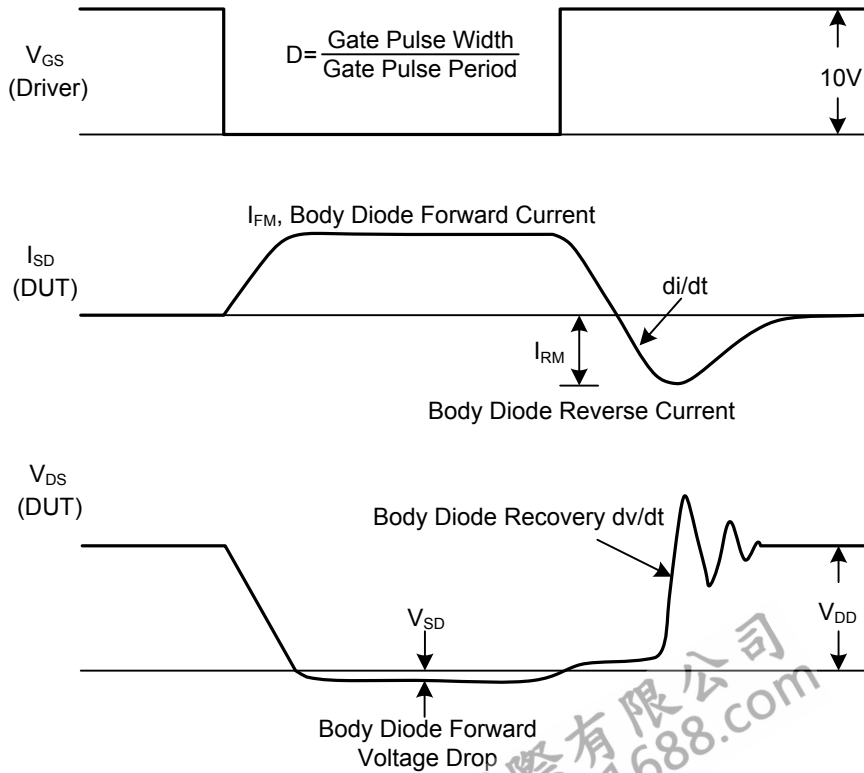
Notes: 1. Pulse Test: Pulse Width < 300μs, Duty cycle < 2.0%.

2. Starting T_J = 25°C, L = 3mH, I_{AS} = 15A, V_{DD} = 40V, V_{GS} = 10V.

TEST CIRCUITS AND WAVEFORMS



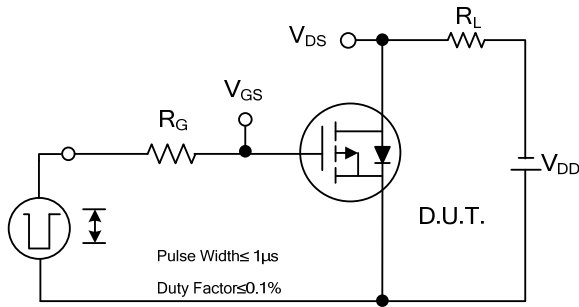
Peak Diode Recovery dv/dt Test Circuit



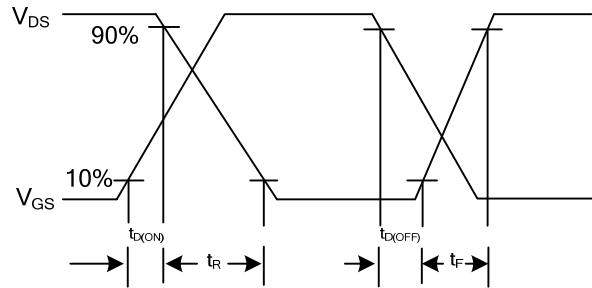
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

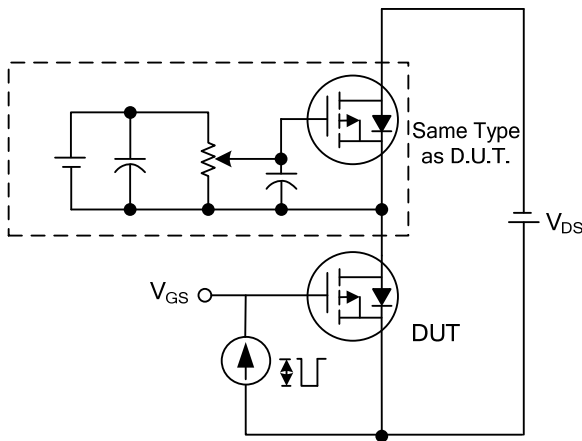
TEST CIRCUITS AND WAVEFORMS



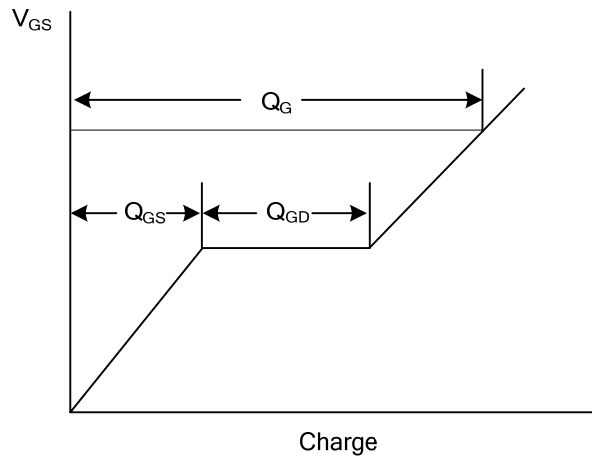
Switching Test Circuit



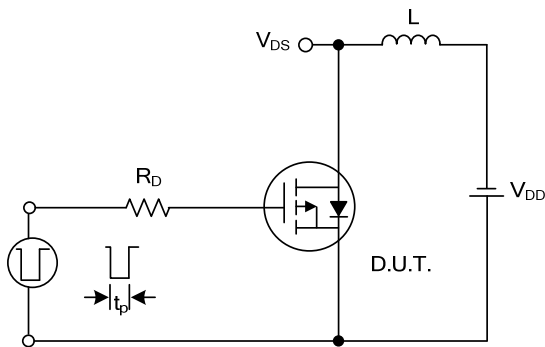
Switching Waveforms



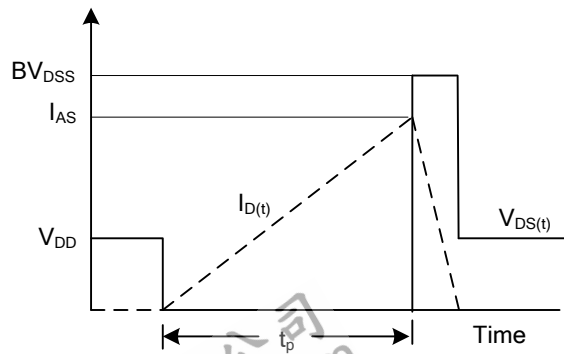
Gate Charge Test Circuit



Gate Charge Waveform

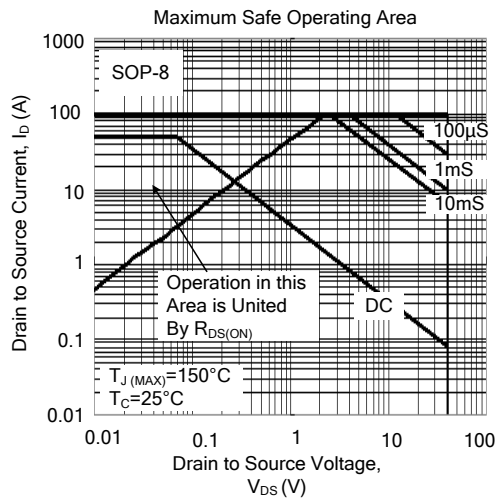


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



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