



UTT40P04

Power MOSFET

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

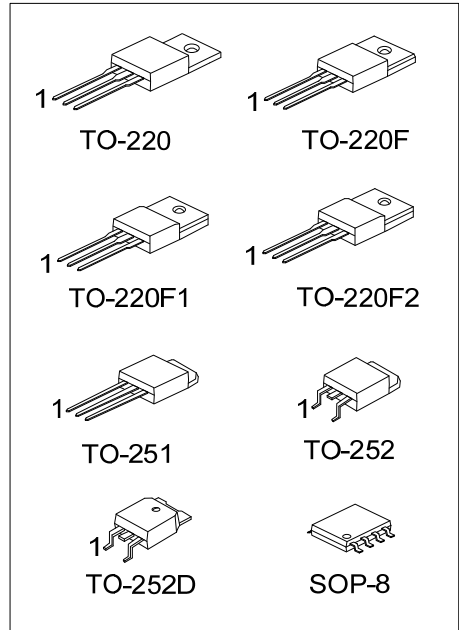
DESCRIPTION

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.

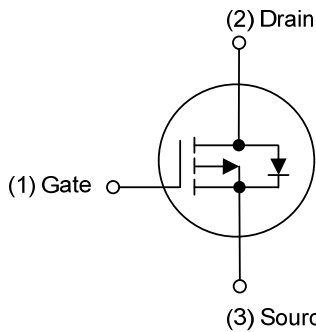
This UTC **UTT40P04** is suitable for Inverter or Power supplies.

FEATURES

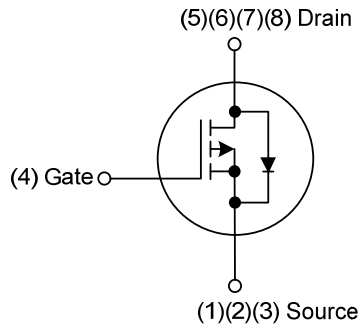
* $R_{DS(ON)} \leq 20 \text{ m}\Omega$ @ $V_{GS} = -10\text{V}$, $I_D = -20\text{A}$,
 $R_{DS(ON)} \leq 30 \text{ m}\Omega$ @ $V_{GS} = -4.5\text{V}$, $I_D = -20\text{A}$



SYMBOL



TO-220/TO-220F1/TO-220F2/TO-220F
TO-251/TO-252/TO-252D



SOP-8

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-TF1-T	UTT40P04G-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
UTT40P04L-TF2-T	UTT40P04G-TF2-T	TO-220F2	G	D	S	-	-	-	-	-	Tube
UTT40P04L-TF3-T	UTT40P04G-TF3-T	TO-220F	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	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, TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F3, 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-220F1 / TO-220F2 / TO-220F 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
Continuous Drain Current		I_D	-40	A
Pulsed Drain Current (Note 2)		I_{DM}	-80	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	71	mJ
Power Dissipation	TO-220	P_D	60	W
	TO-220F/TO-220F1 TO-220F2		31	W
	TO-251/TO-252 TO-252D		46	W
	SOP-8		1.8	W
Junction Temperature		T_J	+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. Repetitive Rating : Pulse width limited by maximum junction temperature.

3. $L = 0.1\text{mH}$, $I_{AS} = -37.8\text{A}$, $V_{DD} = -20\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2	θ_{JA}	62.5	$^\circ\text{C/W}$
	TO-251/TO-252 TO-252D		110 (Note)	$^\circ\text{C/W}$
	SOP-8		90 (Note)	$^\circ\text{C/W}$
Junction to Case	TO-220	θ_{JC}	2.08	$^\circ\text{C/W}$
	TO-220F/TO-220F1 TO-220F2		4	$^\circ\text{C/W}$
	TO-251/TO-252 TO-252D		2.7 (Note)	$^\circ\text{C/W}$
	SOP-8		69 (Note)	$^\circ\text{C/W}$

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

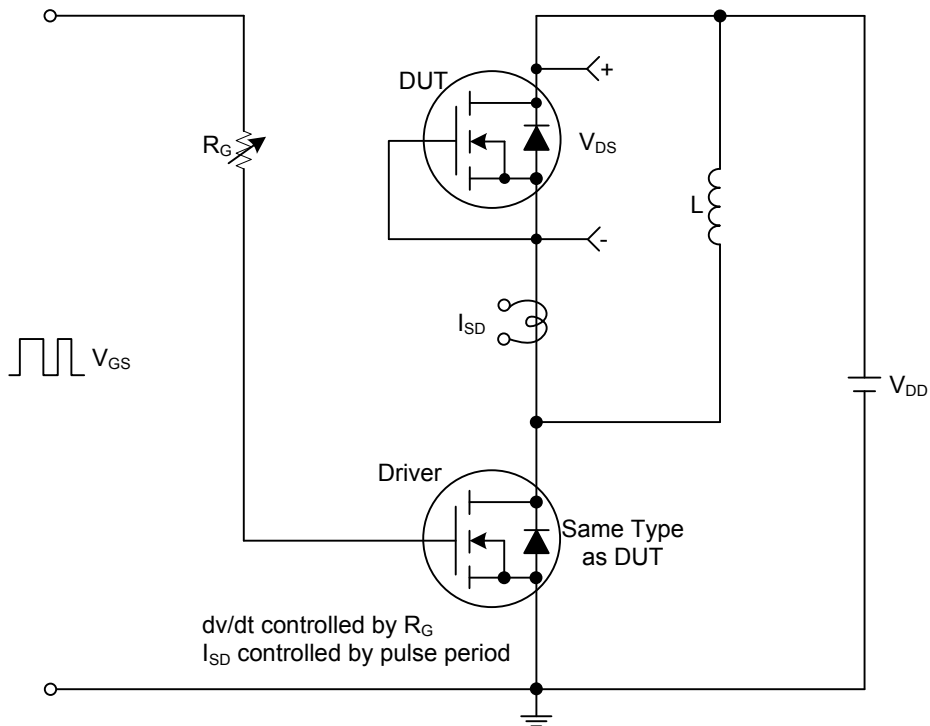
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	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	I _{GSS}			+100	nA
	Reverse				V _{GS} =-20V, V _{DS} =0V	-100
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 =-20A			20	mΩ
		V _{GS} =-4.5V, I _D =-20A			30	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =-20V, f=1.0MHz		2400		pF
Output Capacitance	C _{OSS}			270		pF
Reverse Transfer Capacitance	C _{RSS}			240		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{DD} =-32V, V _{GS} =-10V, I _D =-40A I _G =-1mA (Note1, 2)		55		nC
Gate to Source Charge	Q _{GS}			8		nC
Gate to Drain Charge	Q _{GD}			14		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =-20V, V _{GS} =-10V, I _D =-40A, R _G =3Ω (Note1, 2)		10		ns
Rise Time	t _R			18		ns
Turn-OFF Delay Time	t _{D(OFF)}			88		ns
Fall-Time	t _F			46		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V _{SD}	I _S =-40A, V _{GS} =0V (Note 1)			-1.4	V
Body Diode Reverse Recovery Time	t _{rr}	I _F =-30A, di/dt=100A/μs		92		ns
Body Diode Reverse Recovery Charge	Q _{rr}			400		nC

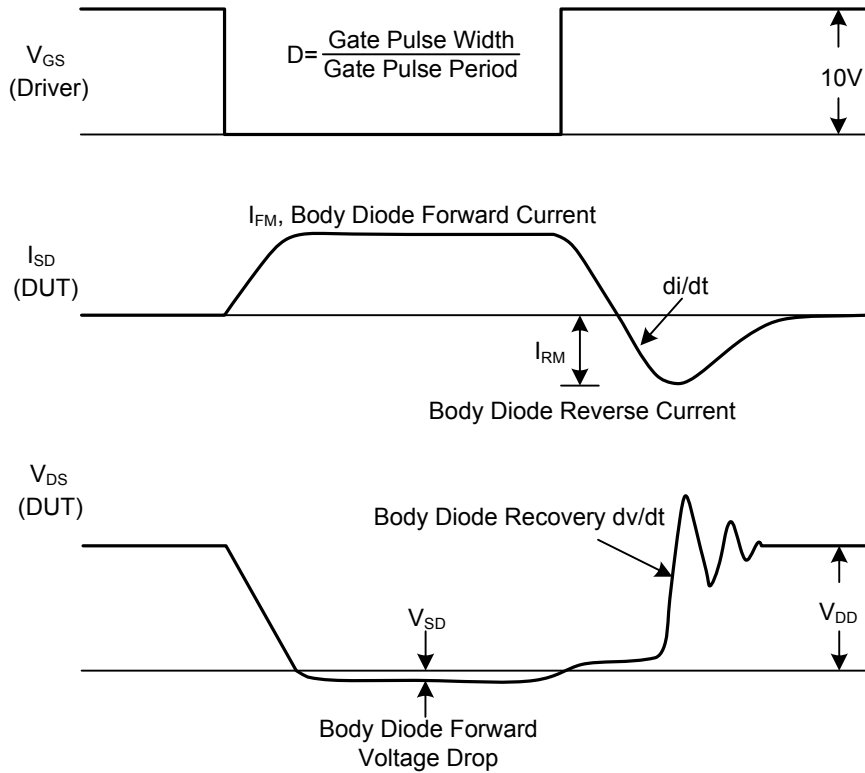
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS



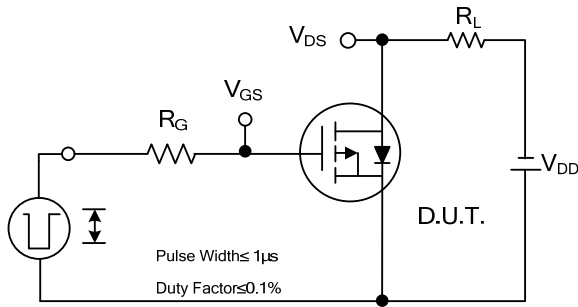
Peak Diode Recovery dv/dt Test Circuit



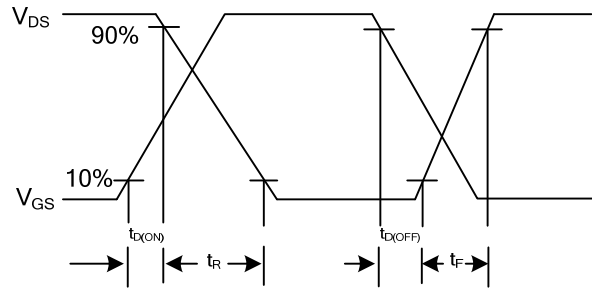
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

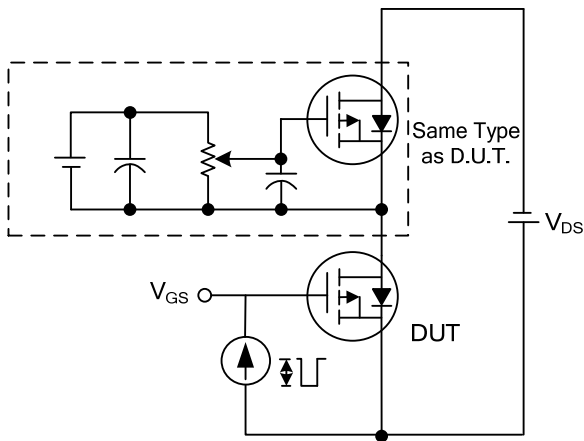
TEST CIRCUITS AND WAVEFORMS



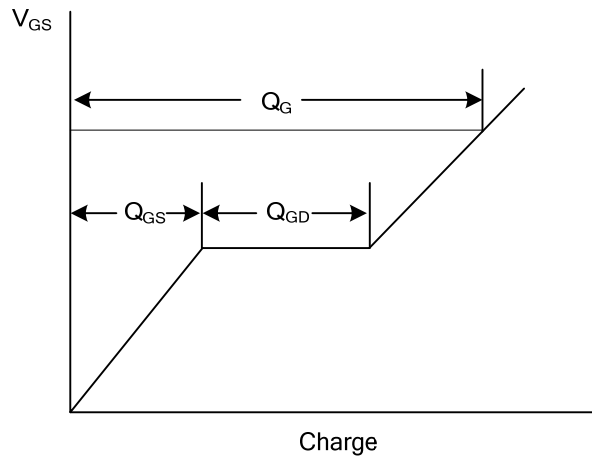
Switching Test Circuit



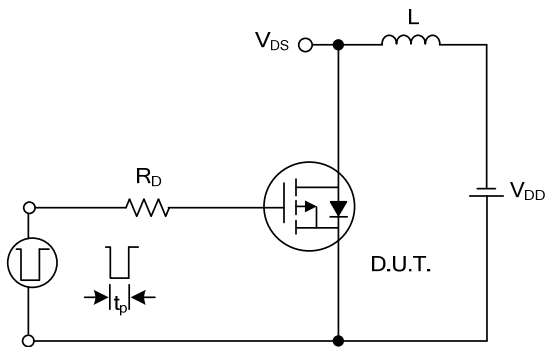
Switching Waveforms



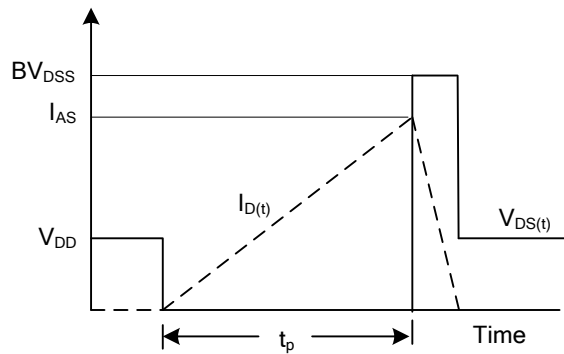
Gate Charge Test Circuit



Gate Charge Waveform

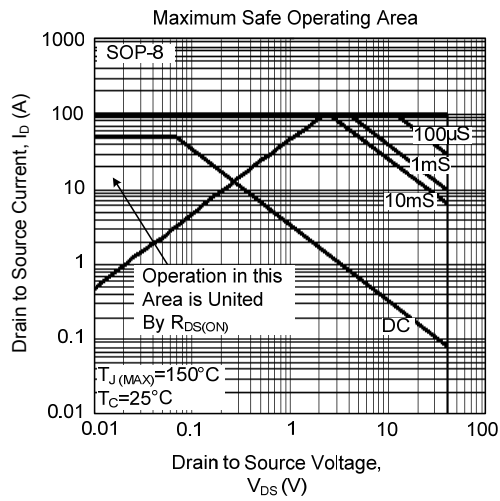


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



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