



UTT30P04

Preliminary

Power MOSFET

-21A, -40V P-CHANNEL POWER MOSFET

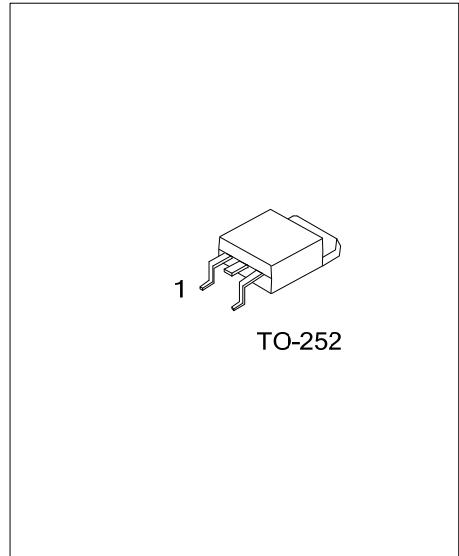
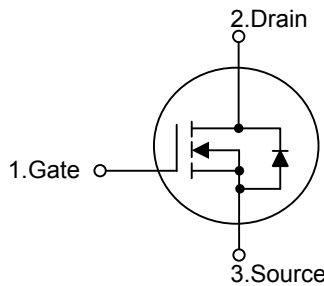
DESCRIPTION

The UTC **UTT30P04** is a P-channel power MOSFET providing customers with fast switching, ruggedized device design, low on-resistance and cost-effectiveness by UTC's advanced technology.

FEATURES

- * Low on-Resistance
- * Fast Switching Speed

SYMBOL



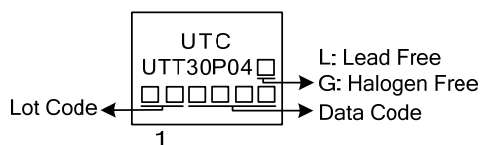
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTT30P04L-TN3-R	UTT30P04G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>UTT30P04L-TN3-R</p>	<p>(1) R: Tape Reel</p> <p>(2) TN3: TO-252</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
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MARKING



■ 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	Continuous	I_D	-21	A
	Pulsed (Note 2)	I_{DM}	-70	A
Avalanche Current (Note 2)		I_{AS}	-27	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	36	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4	V/nS
Power Dissipation		P_D	30	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. $L=0.1\text{mH}$, $I_{AS}=31\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, 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}	40	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	4.1	$^\circ\text{C}/\text{W}$

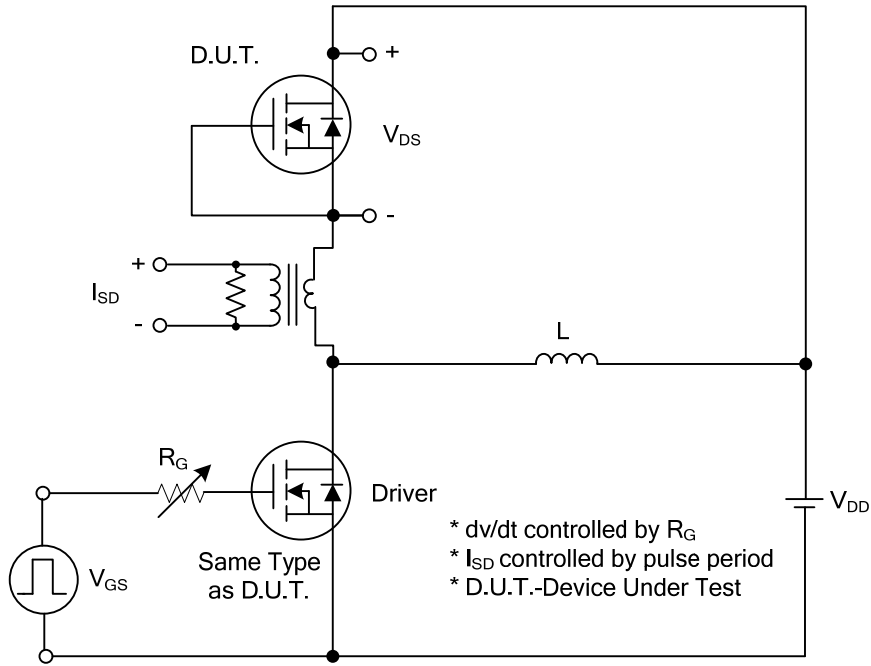
■ ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = -250\mu\text{A}$, $V_{GS} = 0\text{V}$	-40			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = -32\text{V}$, $V_{GS} = 0\text{V}$			1	μA
Gate- Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{V}$, $V_{GS} = +20\text{V}$			+250	nA
		$V_{DS} = 0\text{V}$, $V_{GS} = -20\text{V}$			-250	
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}$, $I_D = -250\mu\text{A}$	-1.0		-3.0	V
Static Drain-Source On-State Resistance (Note 1)	$R_{DS(ON)}$	$V_{GS} = -5\text{V}$, $I_D = -8\text{A}$			73	m Ω
		$V_{GS} = -7\text{V}$, $I_D = -8\text{A}$			50	m Ω
		$V_{GS} = -10\text{V}$, $I_D = -10\text{A}$			40	m Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS} = 0\text{V}$, $V_{DS} = -20\text{V}$, $f = 1.0\text{MHz}$		1090		pF
Output Capacitance	C_{OSS}			175		
Reverse Transfer Capacitance	C_{RSS}			91		
SWITCHING PARAMETERS (Note 2)						
Total Gate Charge (Note 1)	$(V_{GS} = -10\text{V})$	Q_G	$V_{DS} = -20\text{V}$, $I_D = -18\text{A}$		17	nC
	$(V_{GS} = -4.5\text{V})$	Q_G			8.5	
Gate to Source Charge	Q_{GS}			5.5		
Gate to Drain Charge	Q_{GD}			3		
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$			6	ns	
Rise Time	t_R	$V_{GS} = -10\text{V}$, $V_{DS} = -20\text{V}$, $I_D \approx -10\text{A}$, $R_{GS} = 6\Omega$, $R_L = 2\Omega$		16	ns	
Turn-OFF Delay Time	$t_{D(OFF)}$			26	ns	
Fall-Time	t_F			10	ns	
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Continuous Current	I_S				-21	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_F = -10\text{A}$, $V_{GS} = 0\text{V}$			-1.2	V
Reverse Recovery Time (Note 1)	t_{rr}	$I_F = -10\text{A}$, $V_{GS} = 0\text{V}$		15.5		ns
Reverse Recovery Charge	Q_{rr}	$di_F/dt = 100\text{A}/\mu\text{s}$		7.9		nC

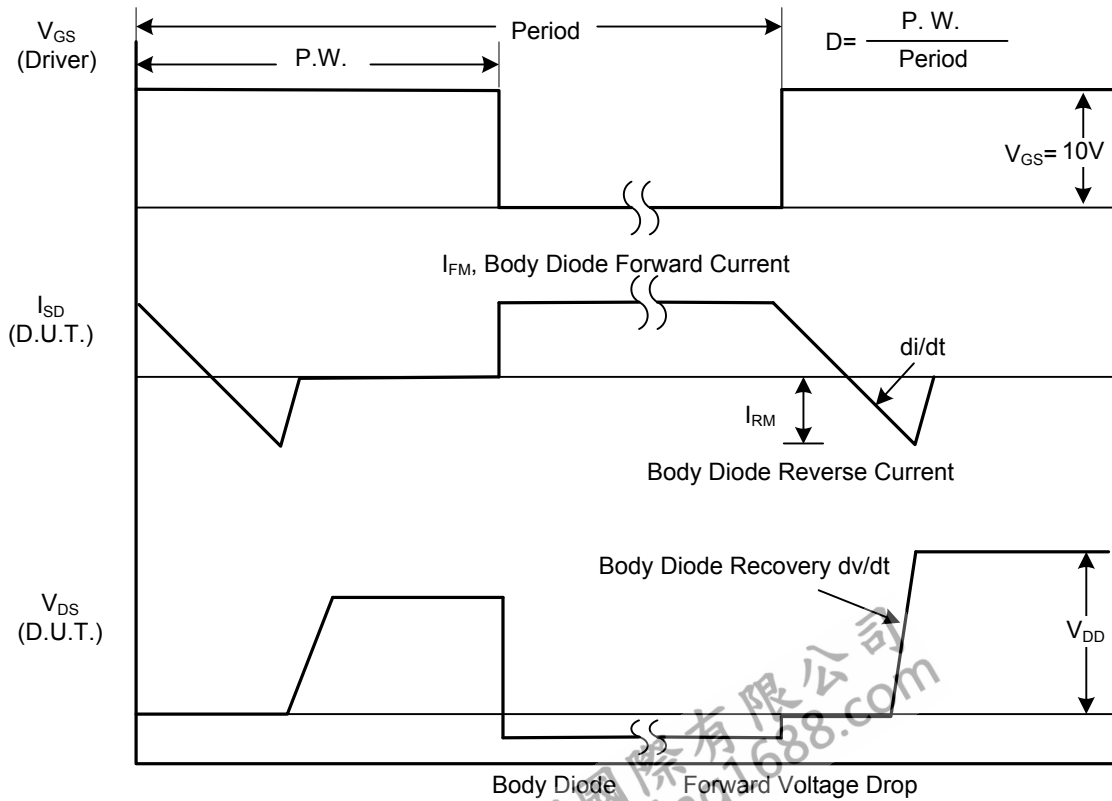
Notes: 1. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

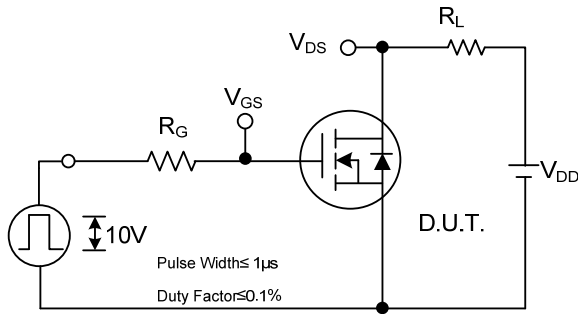


Peak Diode Recovery dv/dt Test Circuit

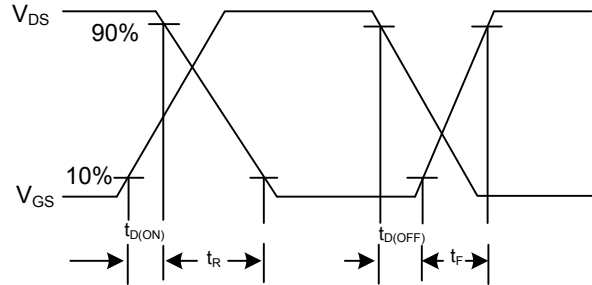


Peak Diode Recovery dv/dt Waveforms

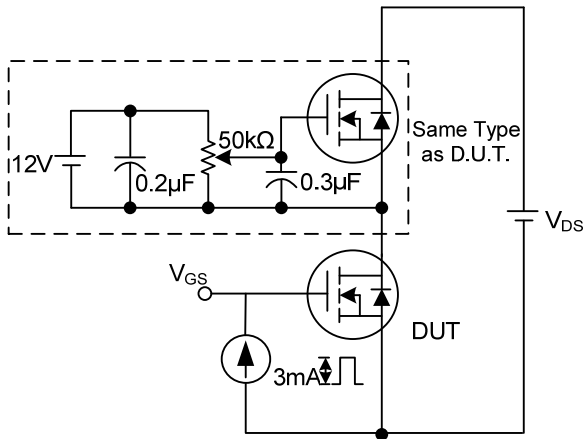
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



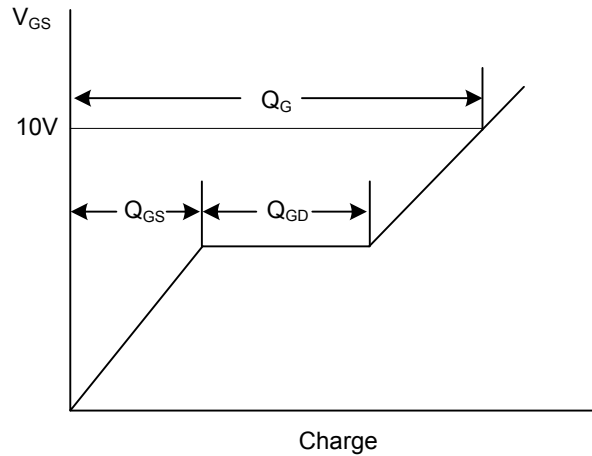
Switching Test Circuit



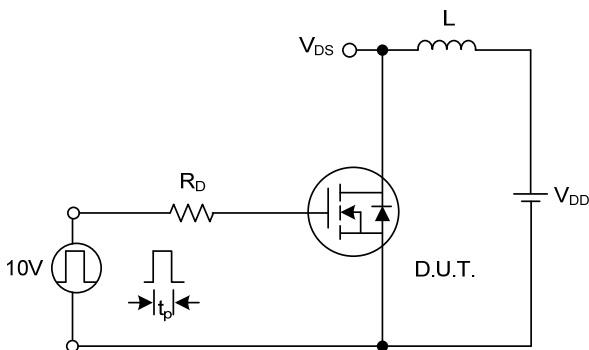
Switching Waveforms



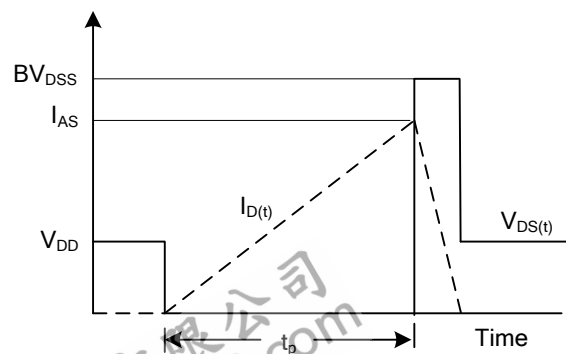
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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