



## UTT65P04

Preliminary

Power MOSFET

### -65A, -40V P-CHANNEL POWER MOSFET

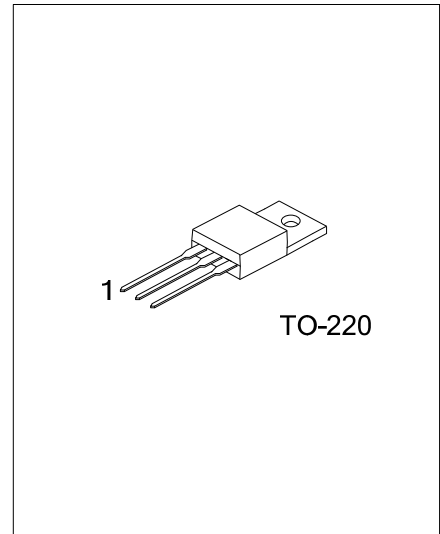
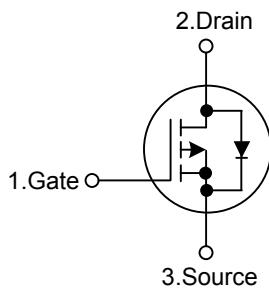
#### DESCRIPTION

The UTC **UTT65P04** 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.

#### FEATURES

- \*  $R_{DS(ON)} < 0.015\Omega$  @  $V_{GS}=-10V, I_D=-30A$
- \* High Switching Speed

#### SYMBOL



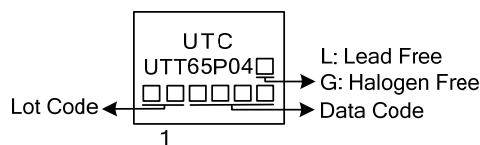
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTT65P04L-TA3-T	UTT65P04G-TA3-T	TO-220	G	D	S	Tube

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

<p>UTT65P04L-TA3-T</p>	<p>(1) T: Tube</p> <p>(2) TA3: TO-220</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



■ 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		$V_{GSS}$	$\pm 20$	V	
Drain Current	Continuous ( $T_J=175^\circ\text{C}$ )	$I_D$	$T_c=25^\circ\text{C}$	-65	A
			$T_c=125^\circ\text{C}$	-37	A
	Pulsed		$I_{DM}$	-240	A
Avalanche Current		$I_{AR}$	-60	A	
Repetitive Avalanche Energy (Note 2)		$E_{AR}$	180	mJ	
Power Dissipation	$T_c=25^\circ\text{C}$	$P_D$	120 (Note 4)	W	
Junction Temperature		$T_J$	-55 ~ +175	$^\circ\text{C}$	
Storage Temperature		$T_{STG}$	-55 ~ +175	$^\circ\text{C}$	

- 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. Duty cycle  $\leq 1\%$ .  
 3. When mounted on 1" square PCB (FR-4 material).  
 4. See SOA curve for voltage derating.

■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	62.5	$^\circ\text{C/W}$
Junction to Case	$\theta_{JC}$	1.25	$^\circ\text{C/W}$

■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

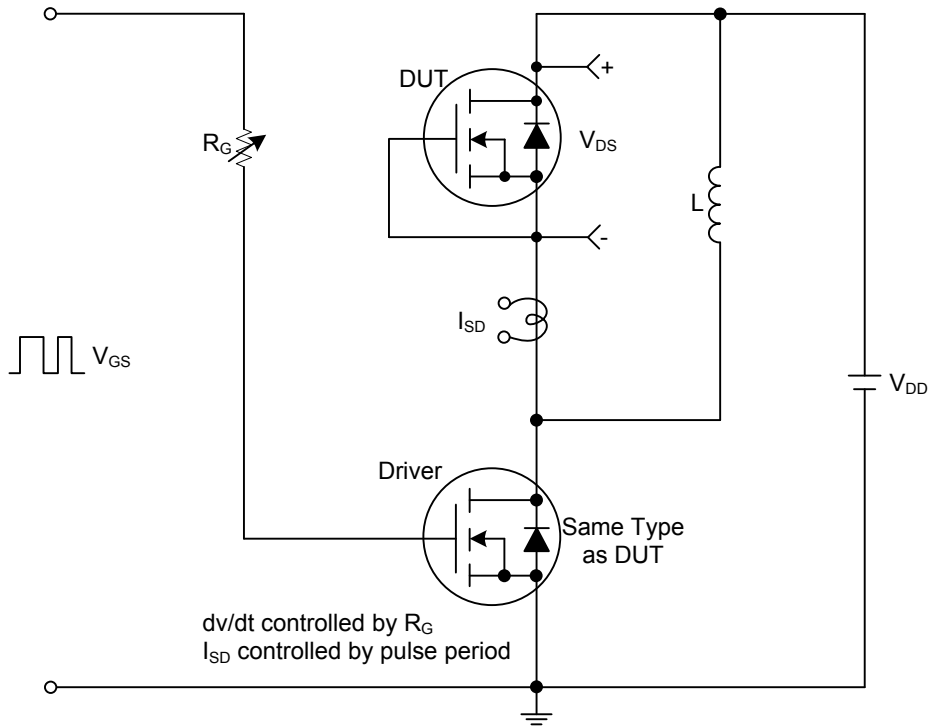
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =-250μA, V <sub>GS</sub> =0V	-40			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =-40V, V <sub>GS</sub> =0V			-1	μA
		V <sub>DS</sub> =-40V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C			-50	
		V <sub>DS</sub> =-40V, V <sub>GS</sub> =0V, T <sub>J</sub> =175°C			-250	
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>				nA
	Reverse					
						-100
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-1		-3	V
Static Drain-Source On-State Resistance (Note 4)	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-30A		0.012	0.015	Ω
		V <sub>GS</sub> =-10V, I <sub>D</sub> =-30A, T <sub>J</sub> =125°C			0.024	
		V <sub>GS</sub> =-10V, I <sub>D</sub> =-30A, T <sub>J</sub> =175°C			0.030	
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-20A		0.018	0.023	
Forward Transconductance (Note 1)	g <sub>FS</sub>	V <sub>DS</sub> =-15V, I <sub>D</sub> =-50A	20			S
On State Drain Current (Note 1)	I <sub>D(ON)</sub>	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-5V	-120			A
<b>DYNAMIC PARAMETERS (Note 2)</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =-25V, f=1.0MHz		5400		pF
Output Capacitance	C <sub>OSS</sub>			640		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			300		pF
<b>SWITCHING PARAMETERS (Note 2, 3)</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-20V, I <sub>D</sub> =-65A		85	130	nC
Gate to Source Charge	Q <sub>GS</sub>			25		nC
Gate to Drain Charge	Q <sub>GD</sub>			15		nC
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =-20V, I <sub>D</sub> =-65A, V <sub>GEN</sub> =-10V, R <sub>L</sub> =0.3Ω, R <sub>G</sub> =2.5Ω		15	25	ns
Rise Time	t <sub>R</sub>			380	580	ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			75	115	ns
Fall-Time	t <sub>F</sub>			140	210	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS (T<sub>C</sub>=25°C) (Note 2)</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>				-65	A
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				-240	A
Drain-Source Diode Forward Voltage (Note 1)	V <sub>SD</sub>	I <sub>F</sub> =-65A, V <sub>GS</sub> =0V		-1.2	-1.5	V
Body Diode Reverse Recovery Time	t <sub>RR</sub>	I <sub>F</sub> =-65A, di/dt=100A/μs		40	80	ns
Peak Reverse Recovery Current	I <sub>RM(REC)</sub>			2.0	4	A
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>			0.04	0.1	μC

Notes: 1. Pulse test; pulse width ≤ 300μs, duty cycle ≤ 2%.

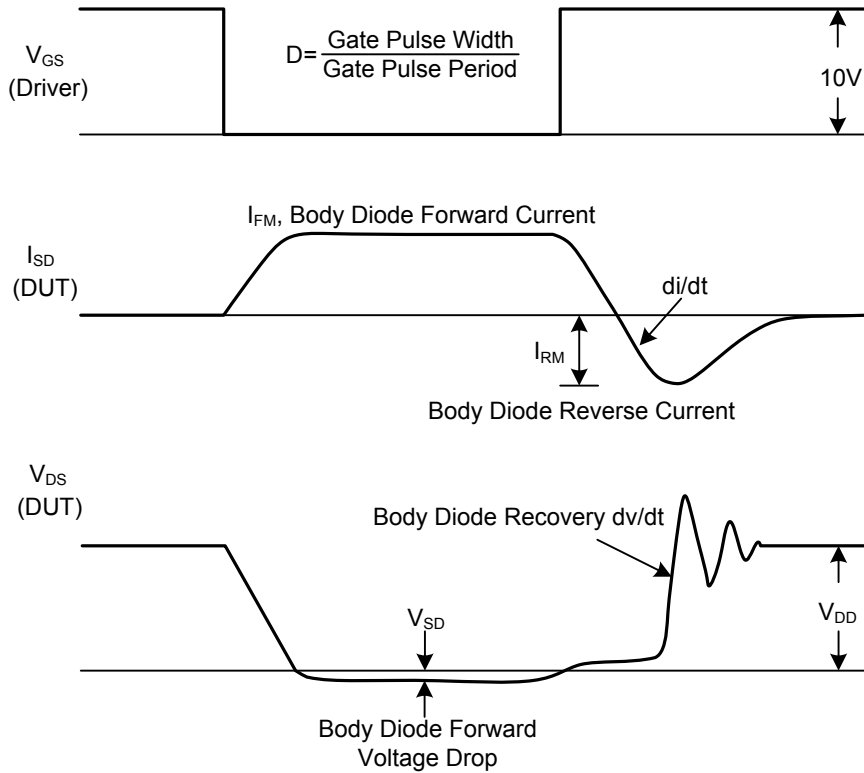
2. Guaranteed by design, not subject to production testing.

3. Independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



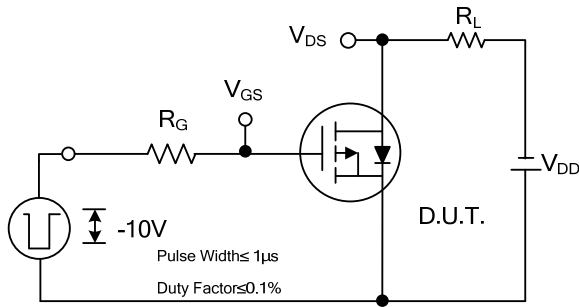
Peak Diode Recovery dv/dt Test Circuit



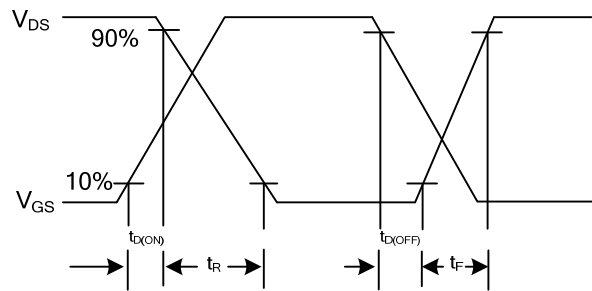
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

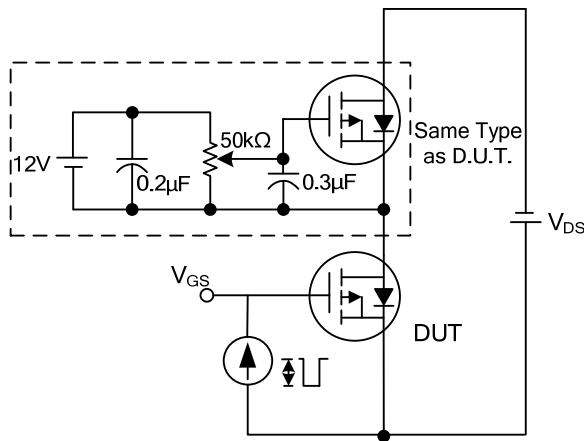
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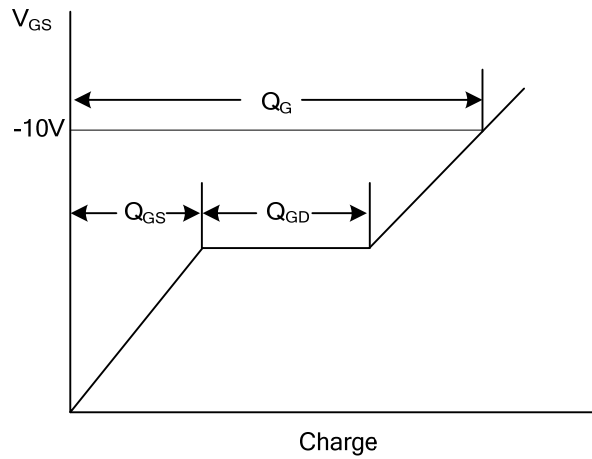
Switching Test Circuit



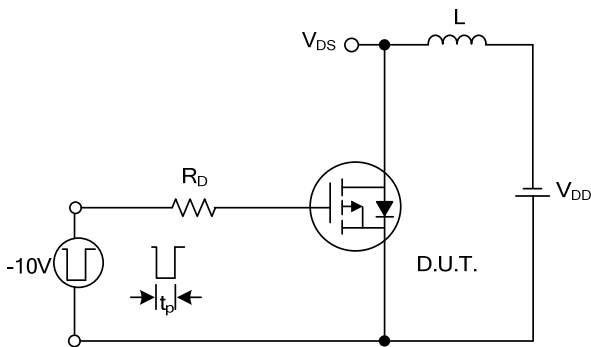
Switching Waveforms



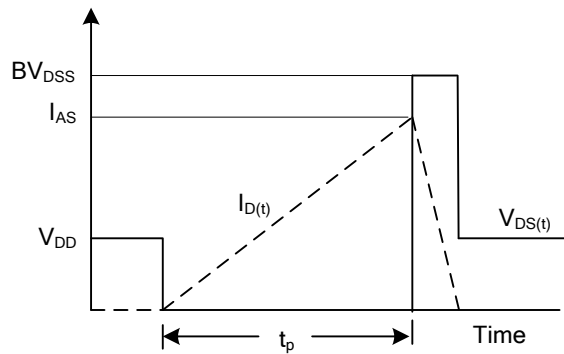
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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