



## UTT36N05

Preliminary

Power MOSFET

### 36A, 50V N-CHANNEL ENHANCEMENT MODE POWER MOSFET TRANSISTOR

#### DESCRIPTION

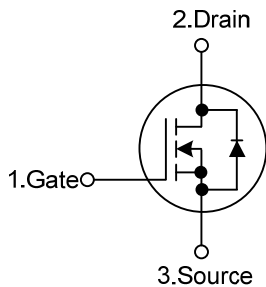
The UTC **UTT36N05** is an N-channel enhancement power MOSFET using UTC's advanced technology to provide the customers with perfect  $R_{DS(ON)}$ , high switching speed, high current capacity and low gate charge.

The UTC **UTT36N05** is suitable for motor control, AC-DC or DC-DC converters and audio amplifiers, etc.

#### FEATURES

- \*  $R_{DS(ON)} < 40m\Omega @ V_{GS}=5V$
- \* High Switching Speed
- \* High Current Capacity

#### SYMBOL



#### ORDERING INFORMATION

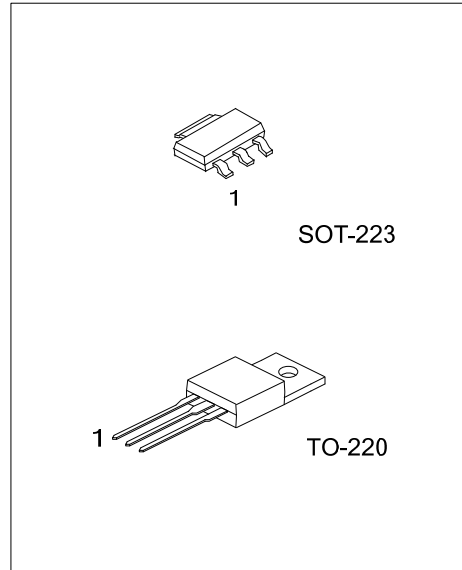
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
-	UTT36N05G-AA3-T	SOT-223	G	D	S	Tube
UTT36N05L-TA3-T	UTT36N05G-TA3-T	TO-220	G	D	S	Tube

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

UTT36N05G-AA3-R (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) AA3: SOT-223, TA3: TO-220 (3) L: Lead Free, G: Halogen Free and Lead Free
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#### MARKING

SOT-223	TO-220



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

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage ( $V_{GS}=0$ )		$V_{DSS}$	50	V	
Drain-Gate Voltage ( $R_{GS}=20\text{k}\Omega$ )		$V_{DGR}$	50	V	
Gate-Source Voltage		$V_{GSS}$	$\pm 15$	V	
Drain Current	Continuous	$I_D$	$T_C=25^\circ\text{C}$	36	A
			$T_C=100^\circ\text{C}$	25	A
	Pulsed (Note 2)		$I_{DM}$	144	A
Avalanche Energy		Single Pulsed	$E_{AS}$	240	mJ
		Repetitive	$E_{AR}$	60	mJ
Power Dissipation ( $T_C=25^\circ\text{C}$ )		$P_D$	SOT-223	11	W
			TO-220	100	W
Junction Temperature		$T_J$	150	$^\circ\text{C}$	
Storage Temperature		$T_{STG}$	-65~175	$^\circ\text{C}$	

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. Pulse width limited by safe operating area.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223	$\theta_{JA}$	150	$^\circ\text{C/W}$
	TO-220		62.5	
Junction to Case	SOT-223	$\theta_{JC}$	11	$^\circ\text{C/W}$
	TO-220		1.25	

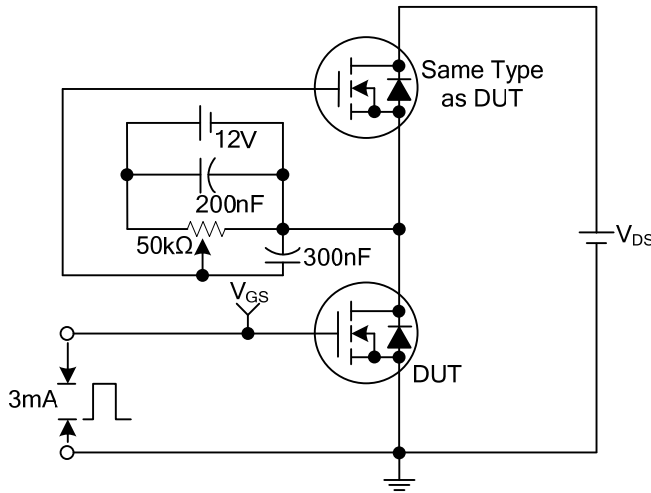
■ ELECTRICAL CHARACTERISTICS ( $T_C=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	50			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=\text{Max Rating}$ , $V_{GS}=0\text{V}$			1	$\mu\text{A}$
		$V_{DS}=\text{Max} \times 0.8$ , $T_C=125^\circ\text{C}$ , $V_{GS}=0\text{V}$			10	
Gate- Source Leakage Current	Forward	$V_{GS}=+15\text{V}$ , $V_{DS}=0\text{V}$			+100	nA
	Reverse	$V_{GS}=-15\text{V}$ , $V_{DS}=0\text{V}$			-100	nA
<b>ON CHARACTERISTICS (Note 1)</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	1	1.6	2.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=5\text{V}$ , $I_D=18\text{A}$		0.033	0.04	$\Omega$
On State Drain Current	$I_{D(ON)}$	$V_{DS}>I_{D(ON)} \times R_{DS(ON)}\text{max}$ , $V_{GS}=10\text{V}$	36			A
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0\text{V}$ , $V_{DS}=25\text{V}$ , $f=1.0\text{MHz}$		1000	1800	pF
Output Capacitance	$C_{OSS}$			133	600	pF
Reverse Transfer Capacitance	$C_{RSS}$			90	200	pF
<b>SWITCHING PARAMETERS</b>						
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=30\text{V}$ , $I_D=1.0\text{A}$ , $R_G=50\Omega$		40	60	ns
Rise Time	$t_R$			60	100	ns
OFF-Voltage Rise Time	$t_{R(VOFF)}$			350	420	ns
Fall-Time	$t_F$			125	160	ns
Total Gate Charge	$Q_G$	$V_{GS}=5\text{V}$ , $V_{DS}=40\text{V}$ , $I_D=36\text{A}$		76		nC
Gate to Source Charge	$Q_{GS}$			11		nC
Gate to Drain Charge	$Q_{GD}$			11		nC
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	$I_S$				36	A
Maximum Body-Diode Pulsed Current	$I_{SM}$	(Note 2)			144	A
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_{SD}=36\text{A}$ , $V_{GS}=0\text{V}$ (Note 1)			1.6	V

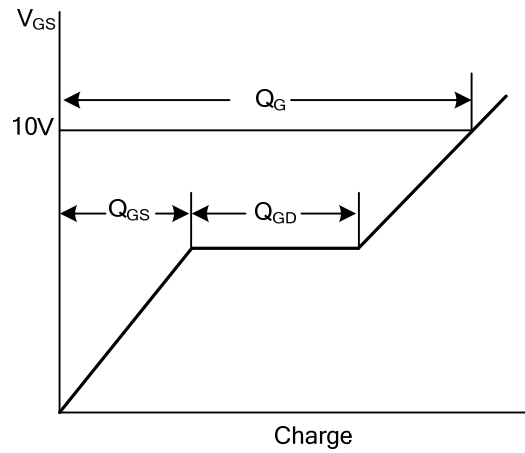
Notes: 1. Pulsed: Pulse duration = 300 ms, duty cycle 1.5%

2. Pulse width limited by safe operating area.

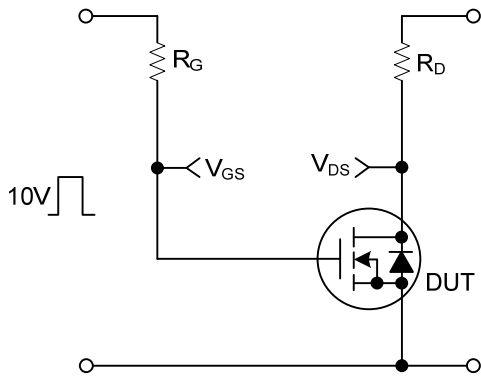
■ TEST CIRCUITS AND WAVEFORMS



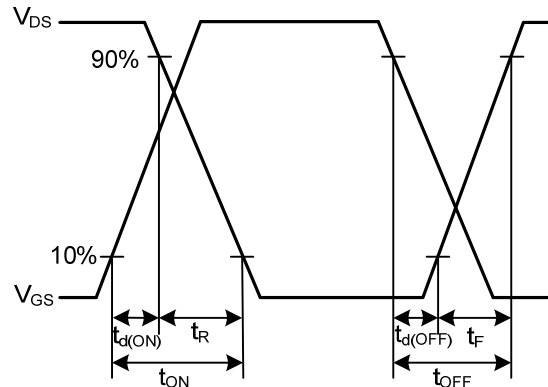
Gate Charge Test Circuit



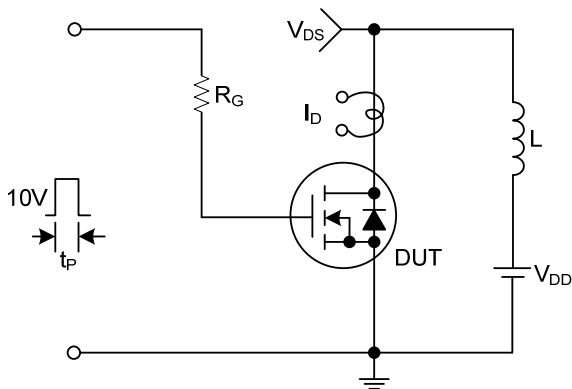
Gate Charge Waveforms



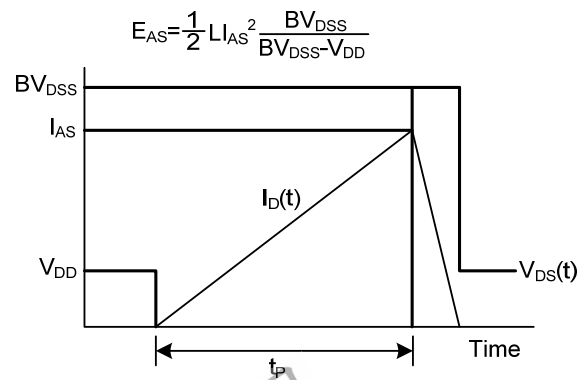
Resistive Switching Test Circuit



Resistive Switching Waveforms



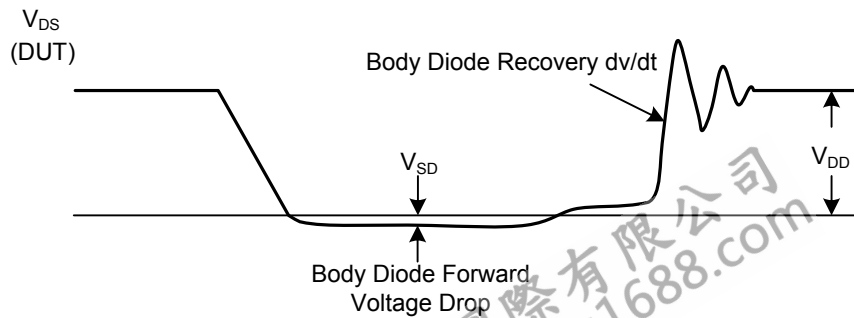
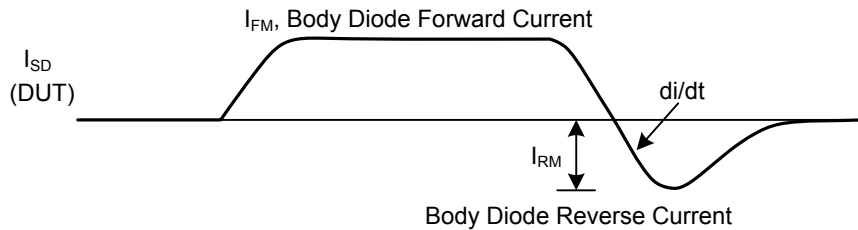
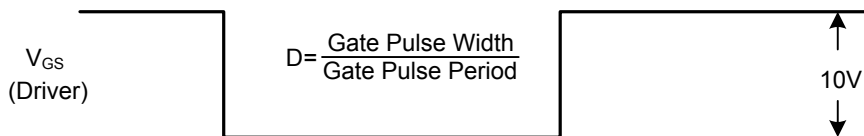
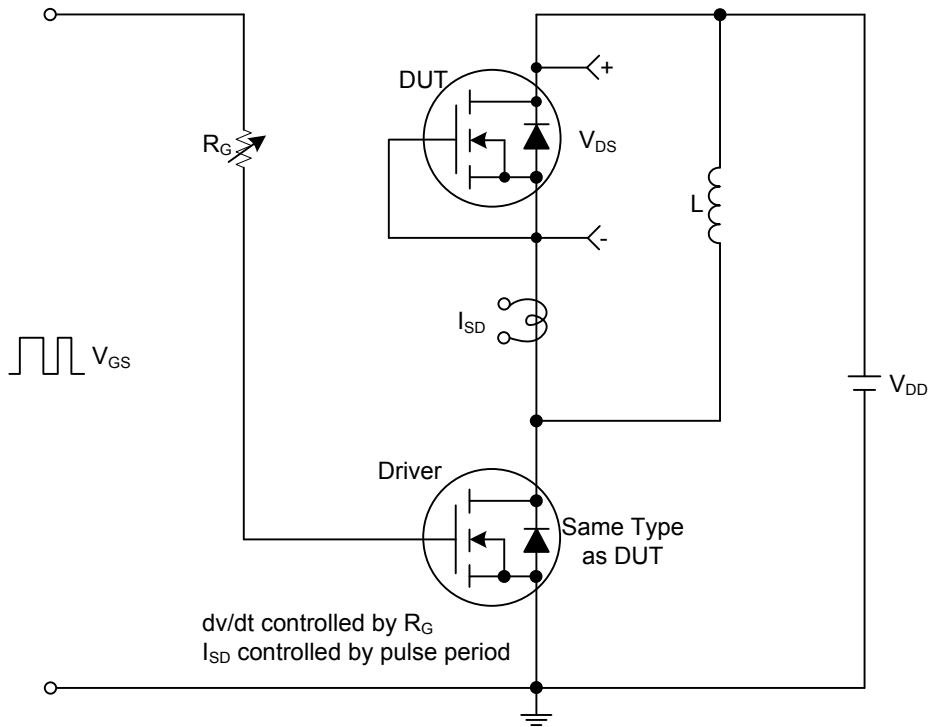
Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

$$E_{AS} = \frac{1}{2} L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

■ TEST CIRCUITS AND WAVEFORMS(Cont.)



Peak Diode Recovery dv/dt Test Circuit and Waveforms

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