



# N-CHANNEL ENHANCEMENT MODE POWER MOSFET

### DESCRIPTION

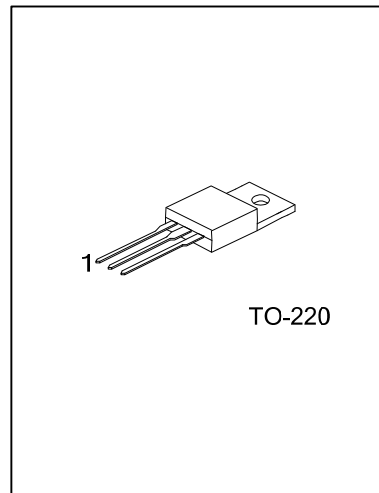
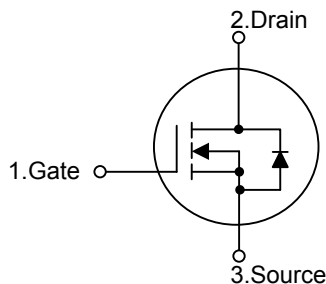
The UTC **UTT150N03** is a N-channel power MOSFET, using UTC's advanced trench technology to provide customers with a minimum on-state resistance, low gate charge and superior switching performance.

The UTC **UTT150N03** is generally applied in DC to DC convertor, synchronous or conventional switching PWM controllers.

### FEATURES

- \* 150A, 30V,  $R_{DS(ON)}=4.1m\Omega @ V_{GS}=10V, I_D = 75A$   
 $R_{DS(ON)}=4.6m\Omega @ V_{GS}=4.5V, I_D = 75A$
- \* High Switching Speed
- \* High Power and Current Handling Capability
- \* RoHS Compliant

### SYMBOL



### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTT150N03L-TA3-T	UTT150N03G-TA3-T	TO-220	G	D	S	Tube

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

UTT150N03L-TA3-T	(1)Packing Type	(1) T: Tube
	(2)Package Type	(2) TA3: TO-220
	(3)Lead Free	(3) G: Halogen Free, L: Lead Free

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DS}$	30	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	V
Drain Current	Continuous	$I_D$	150	A
	Pulsed	$I_{DM}$	266	A
Single Pulsed Avalanche Energy (Note 2)		$E_{AS}$	300	mJ
Power Dissipation	Power Dissipation	$P_D$	160	W
	Derate above $25^\circ\text{C}$		1.07	W/ $^\circ\text{C}$
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55~+150	$^\circ\text{C}$

Note: 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.

■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	62	$^\circ\text{C/W}$
Junction to Case	$\theta_{JC}$	0.94	$^\circ\text{C/W}$

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

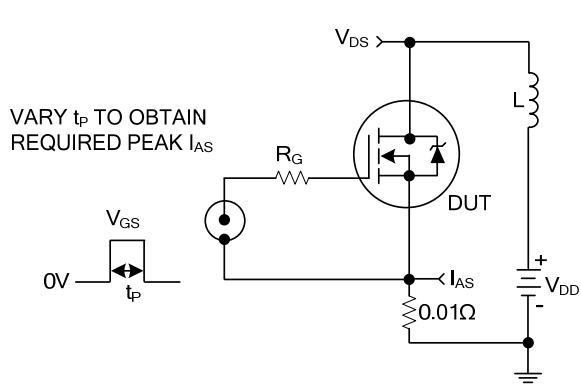
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	30			V	
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=24\text{V}$ , $V_{GS}=0\text{V}$			1	$\mu\text{A}$	
Gate- Source Leakage Current	Forward	$I_{GSS}$			+100	nA	
	Reverse						$V_{GS}=+20\text{V}$ , $V_{DS}=0\text{V}$
					-100	nA	
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	1		3	V	
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=75\text{A}$		3.4	4.1	m $\Omega$	
		$V_{GS}=4.5\text{V}$ , $I_D=75\text{A}$		4.0	4.6		
<b>DYNAMIC PARAMETERS</b>							
Input Capacitance	$C_{ISS}$	$V_{GS}=0\text{V}$ , $V_{DS}=15\text{V}$ , $f=1.0\text{MHz}$		5200		pF	
Output Capacitance	$C_{OSS}$			970		pF	
Reverse Transfer Capacitance	$C_{RSS}$			570		pF	
<b>SWITCHING PARAMETERS</b>							
Gate Resistance	$R_G$	$V_{GS}=0.5\text{V}$ , $f=1\text{MHz}$		2.1		$\Omega$	
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=0\sim 10\text{V}$ , $V_{DD}=15\text{V}$ , $I_D=75\text{A}$ , $I_G=1\text{mA}$		106	132	nC	
	$Q_{G(5)}$	$V_{GS}=0\sim 5\text{V}$ , $V_{DD}=15\text{V}$ , $I_D=75\text{A}$ , $I_G=1\text{mA}$		56	69	nC	
Threshold Gate Charge	$Q_{G(TH)}$	$V_{GS}=0\sim 1\text{V}$ , $V_{DD}=15\text{V}$ , $I_D=75\text{A}$ , $I_G=1\text{mA}$		5.0	6.5	nC	
Gate to Source Charge	$Q_{GS}$	$V_{DD}=15\text{V}$ , $I_D=75\text{A}$ , $I_G=1\text{mA}$		15		nC	
Gate Charge Threshold to Plateau	$Q_{GS2}$			10		nC	
Gate to Drain Charge	$Q_{GD}$			23		nC	
Turn-ON Time	$t_{ON}$					168	ns
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=15\text{V}$ , $I_D=75\text{A}$ , $V_{GS}=4.5\text{V}$ , $R_{GS}=3.3\Omega$		11		ns	
Rise Time	$t_R$			105		ns	
Turn-OFF Delay Time	$t_{D(OFF)}$			70		ns	
Fall-Time	$t_F$			46		ns	
Turn-OFF Time	$t_{OFF}$					173	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>							
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_S=150\text{A}$			1.25	V	
		$I_S=15\text{A}$			1.0	V	
Body Diode Reverse Recovery Time	$t_{RR}$	$I_{SD}=150\text{A}$ , $dI_{SD}/dt=100\text{A}/\mu\text{s}$			37	ns	
Body Diode Reverse Recovery Charge	$Q_{RR}$				21	nC	

Notes: 1. Package current limitation is 80A.

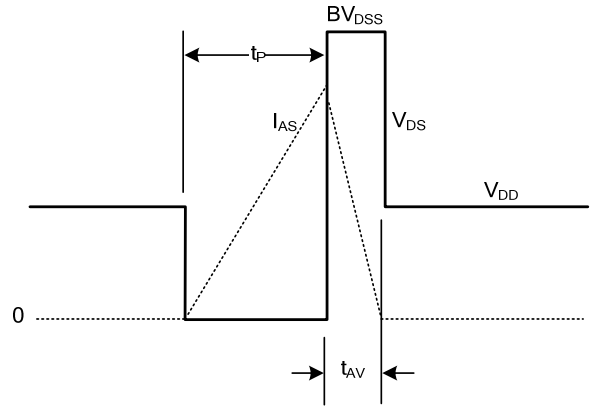
2. Starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.15\text{mH}$ ,  $I_{AS} = 64\text{A}$ ,  $V_{DD} = 27\text{V}$ ,  $V_{GS}=10\text{V}$

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

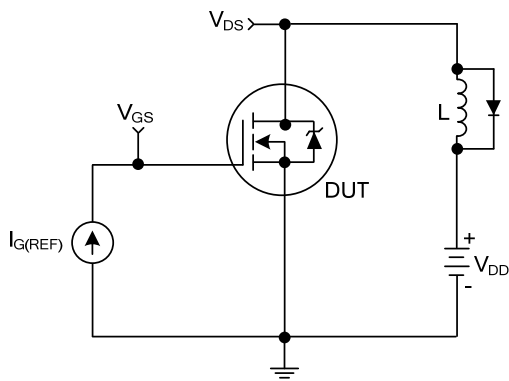
TEST CIRCUITS AND WAVEFORMS



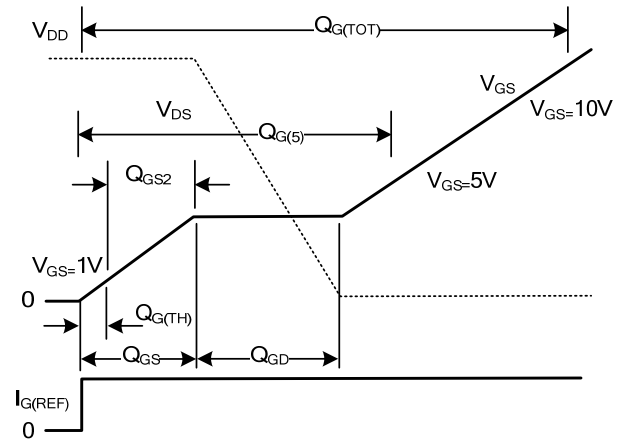
Unclamped Energy Test Circuit



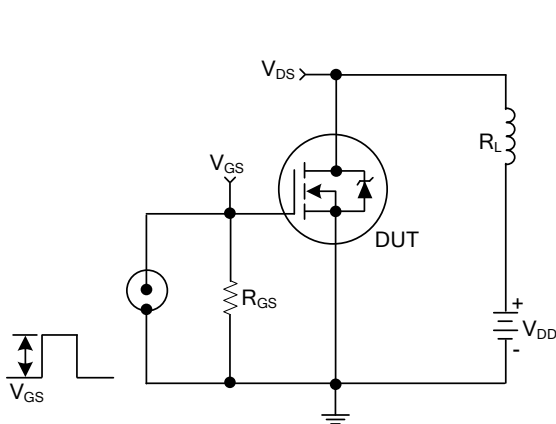
Unclamped Energy Waveforms



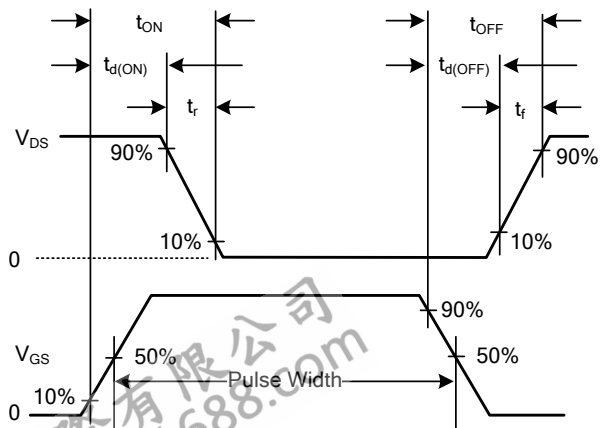
Gate Charge Test Circuit



Gate Charge Waveforms



Switching Time Test Circuit



Switching Time Waveforms

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