



## UTT220N03

Preliminary

Power MOSFET

### N-CHANNEL ENHANCEMENT MODE POWER MOSFET

#### DESCRIPTION

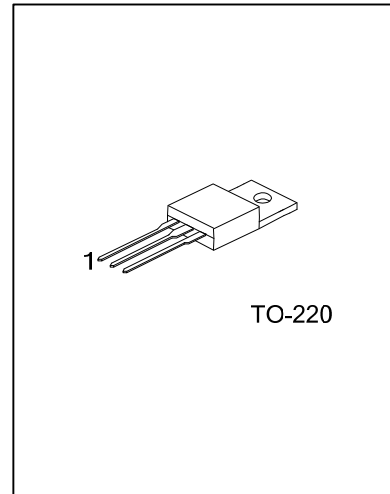
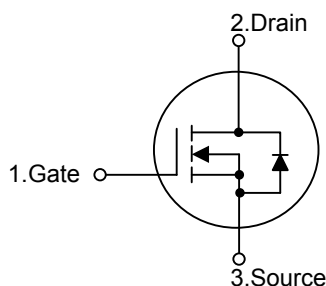
The UTC **UTT220N03** is a N-channel MOSFET, using UTC's advanced technology to provide customers with a minimum on-state resistance and superior switching performance.

The UTC **UTT220N03** is generally applied in DC to DC convertor or synchronous rectification

#### FEATURES

- \* 220A, 30V,  $R_{DS(ON)}=2.0m\Omega @ V_{GS}=10V, I_D = 80A$
- \* Low Gate Charge (Typical 84nC)
- \* Fast Switching
- \* 100% Avalanche Tested
- \* High Power and Current Handling Capability
- \* RoHS Compliant

#### SYMBOL



#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTT220N03L-TA3-T	UTT220N03G-TA3-T	TO-220	G	D	S	Tube

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

UTT220N03L-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 noted (Note 6)]

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DS}$	30	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	V
Drain Current	Continuous	$I_D$	220	A
	Pulsed (Note 1)	$I_{DM}$	876	A
Single Pulsed Avalanche Energy (Note 2)		$E_{AS}$	864	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	6.0	V/ns
Power Dissipation	$T_C=25^\circ\text{C}$	$P_D$	214	W
	Derate above $25^\circ\text{C}$		1.43	W/ $^\circ\text{C}$
Junction Temperature		$T_J$	-55~+175	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55~+175	$^\circ\text{C}$

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	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	0.7	$^\circ\text{C}/\text{W}$

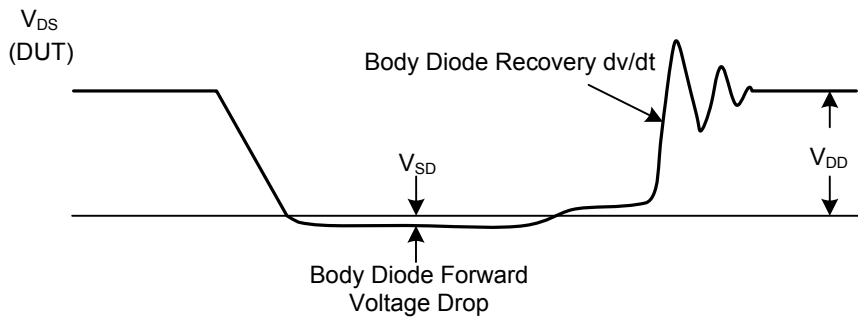
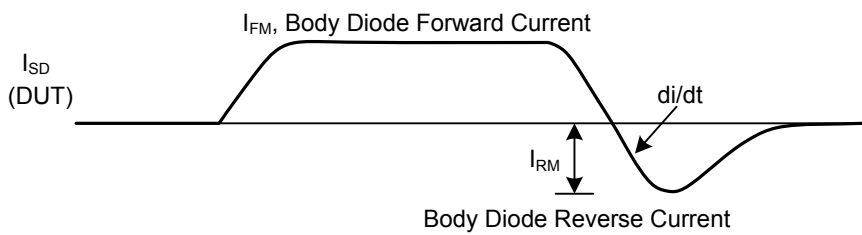
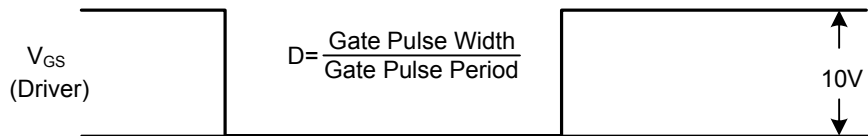
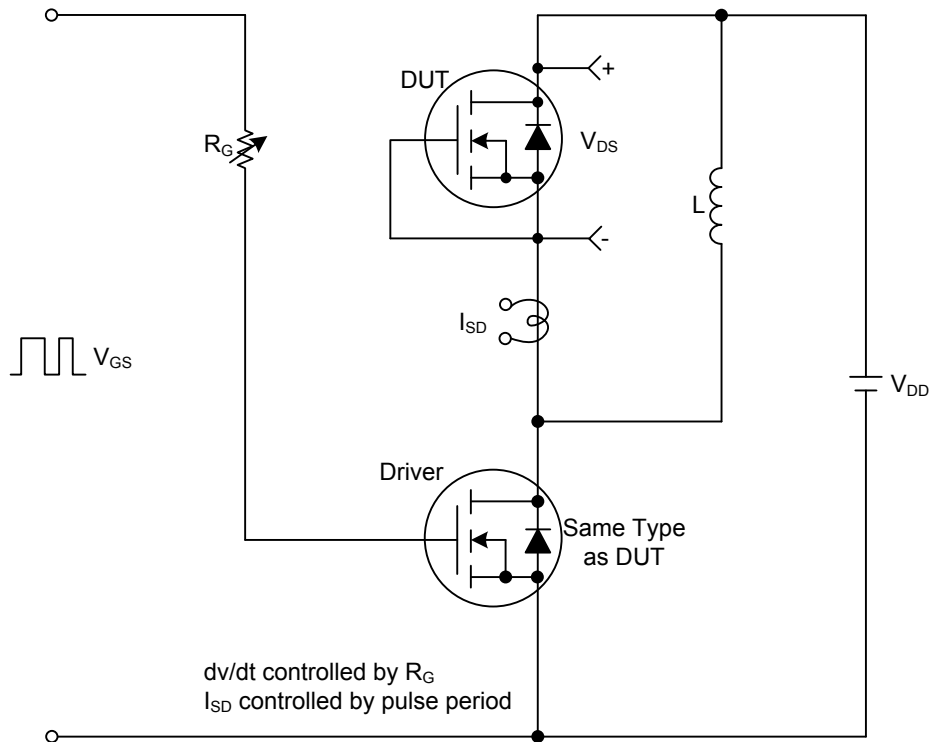
■ ELECTRICAL CHARACTERISTICS (T<sub>c</sub>=25°C, unless otherwise noted)

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, T <sub>C</sub> =25°C	30			V
Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Reference to 25°C, I <sub>D</sub> =250μA		30		mV/°C
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =32V, V <sub>GS</sub> =0V			10	μA
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>			+100	nA
	Reverse				-100	nA
<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	1.0		3.0	V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =80A		2.0	2.4	mΩ
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		5490	7300	pF
Output Capacitance	C <sub>OSS</sub>			1220	1620	pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			155	233	pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =24V, I <sub>D</sub> =80A (Note 4, 5)		84	109	nC
Gate to Source Charge	Q <sub>GS</sub>			19		nC
	Q <sub>GS2</sub>			9.5		nC
Gate to Drain Charge	Q <sub>GD</sub>		12		nC	
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =15V, I <sub>D</sub> =80A, R <sub>GEN</sub> =4.7Ω, V <sub>GS</sub> =10V (Note 4, 5)		17	44	ns
Rise Time	t <sub>R</sub>			8	26	ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			71	152	ns
Fall-Time	t <sub>F</sub>			17	44	ns
Equivalent Series Resistance (G-S)	ESR			1.1		Ω
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>				219	A
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				876	A
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =80A, V <sub>GS</sub> =0V			1.3	V
Body Diode Reverse Recovery Time	t <sub>RR</sub>	I <sub>S</sub> =80A, V <sub>GS</sub> =0V, di <sub>F</sub> /dt=100A/μs		54		ns
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	(Note 4)		49		nC

- Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature  
 2. L = 3mH, I<sub>AS</sub> = 24A, V<sub>DD</sub> = 30V, R<sub>G</sub> = 25Ω, Starting T<sub>J</sub> = 25°C  
 3. I<sub>SD</sub> ≤ 80A, di/dt ≤ 200A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub> = 25°C  
 4. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%  
 5. Essentially independent of operating temperature

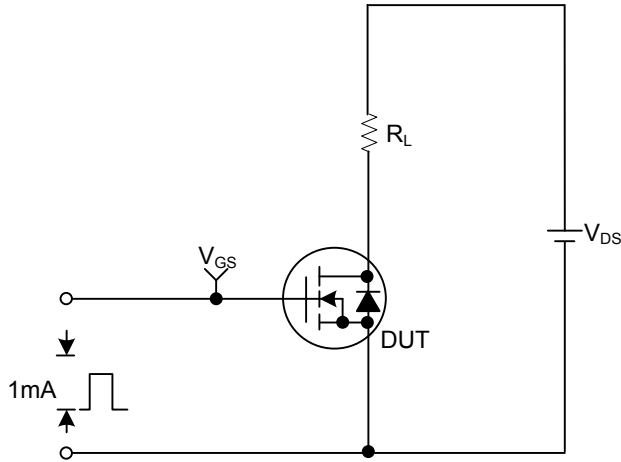
■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & Waveforms

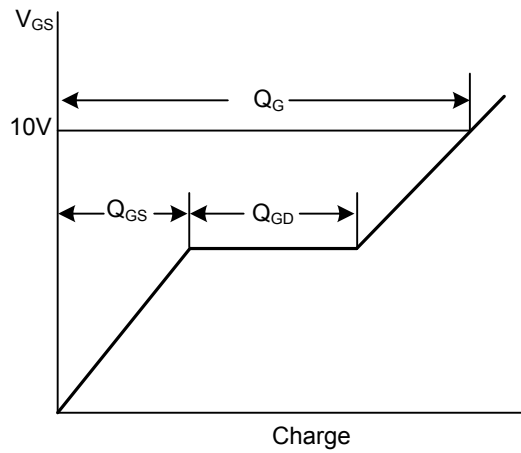


■ TEST CIRCUITS AND WAVEFORMS(Cont.)

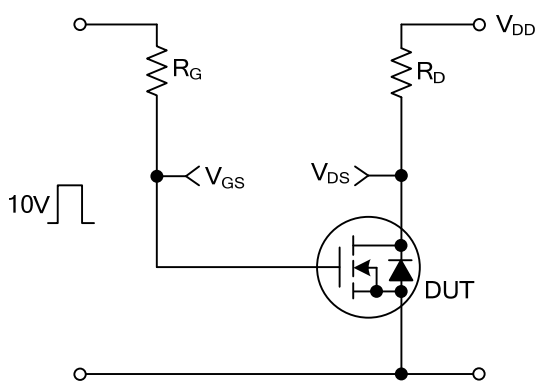
Gate Charge Test Circuit



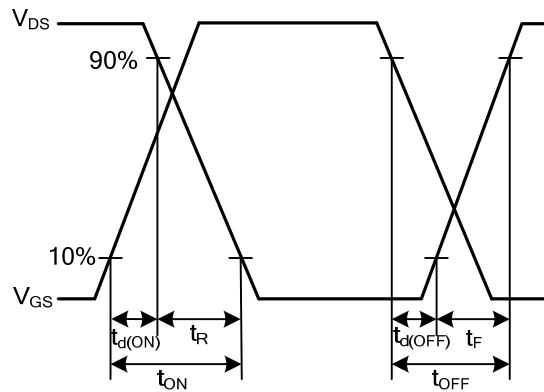
Gate Charge Waveforms



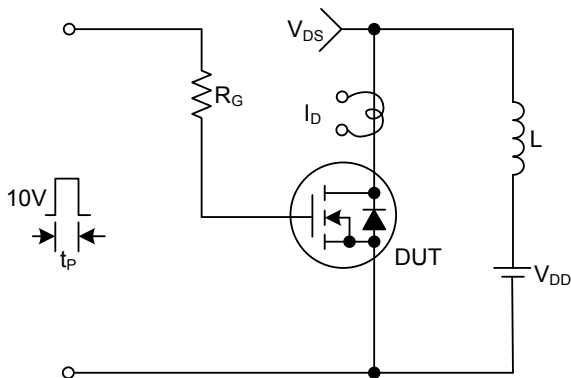
Resistive Switching Test Circuit



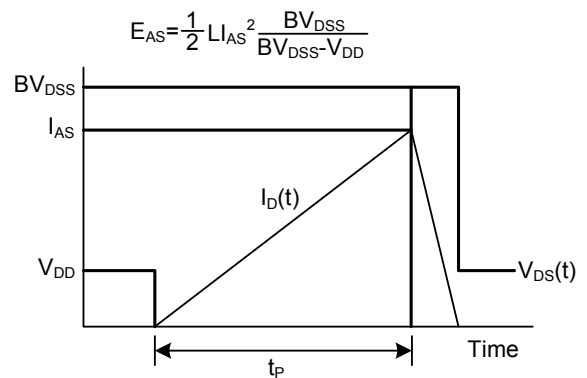
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms





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