



# UT90N03

*Power MOSFET*

## 90A, 30V N-CHANNEL(D-S) POWER MOSFET

■ DESCRIPTION

The UTC **UT90N03** is an N-channel enhancement mode Power FET, it uses UTC's advanced technology to provide customers a minimum on-state resistance.

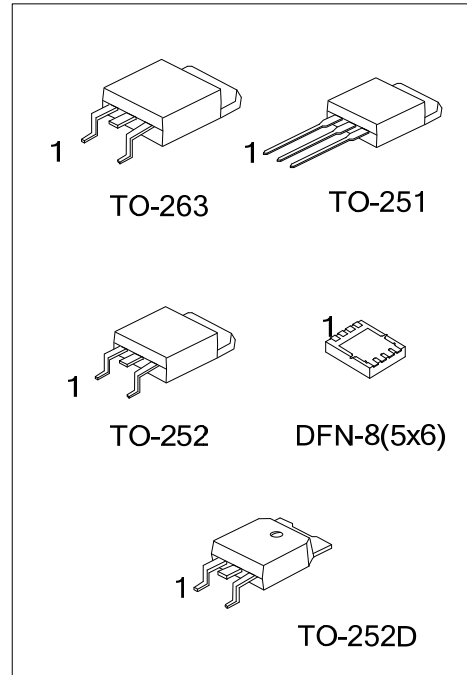
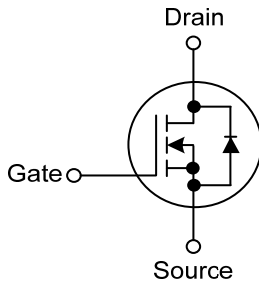
The UTC **UT90N03** is suitable for server and DC-DC converters.

■ FEATURES

\*  $R_{DS(ON)} < 4.5\ m\Omega$  @  $V_{GS}=10V, I_D=28.8A$

\* Improved dv/dt capability

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT90N03L-x-TM3-T	UT90N03G-x-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
UT90N03L-x-TN3-R	UT90N03G-x-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UT90N03L-x-TND-R	UT90N03G-x-TND-R	TO-252D	G	D	S	-	-	-	-	-	Tape Reel
UT90N03L-x-TQ2-T	UT90N03G-x-TQ2-T	TO-263	G	D	S	-	-	-	-	-	Tube
UT90N03L-x-TQ2-R	UT90N03G-x-TQ2-R	TO-263	G	D	S	-	-	-	-	-	Tape Reel
-	UT90N03G-x-K08-5060-R	DFN-8(5x6)	S	S	S	G	D	D	D	D	Tape Reel

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

<p>UT90N03L-TM3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TM3: TO-251, TN3: TO-252, TND: TO-252D</p> <p>TQ2: TO-263, K08-5060: DFN-8(5x6)</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
---	--

■ MARKING

TO-251 / TO-252 / TO-252D / TO-263	DFN-8(5x6)

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

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		$V_{DSS}$	30	V	
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V	
Drain Current	$T_C=25^\circ\text{C}$ (Note 2, 5)	$I_D$	90	A	
	$T_A=25^\circ\text{C}$ (Note 3, 4)		28.8	A	
	Pulsed	$I_{DM}$	90	A	
Avalanche Current Pulse ( $L=0.074\text{mH}$ )		$I_{AS}$	90	A	
Single Pulsed Avalanche Energy ( $L=0.074\text{mH}$ )		$E_{AS}$	300	mJ	
Continuous Source-Drain Diode Current	$T_C=25^\circ\text{C}$ (Note 2, 5)	$I_S$	90	A	
	$T_A=25^\circ\text{C}$ (Note 3, 4)		3.13	A	
Power Dissipation	$T_C=25^\circ\text{C}$ (Note 2)	$P_D$	TO-251/TO-252	W	
			TO-252D		187
			TO-263		220
	DFN-8(5x6)		21		
	$T_A=25^\circ\text{C}$ (Note 3, 4)		3.75	W	
Junction Temperature		$T_J$	-55~+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. Based on  $T_C=25^\circ\text{C}$ .  
 3. Surface Mounted on 1"x1" FR4 board.  
 4.  $t=10\text{sec}$ .  
 5. Calculated based on maximum junction temperature. Package limitation current is 90A.

■ THERMAL CHARACTERISTICS

PARAMETER		SYMBOL	RATINGS	UNIT	
Junction to Ambient (Note 1, 2)	$t \leq 10\text{sec}$	$\theta_{JA}$	TO-251/TO-252	$^\circ\text{C/W}$	
			TO-252D/TO-263		40
			DFN-8(5x6)		40.3
Junction to Case	Steady State	$\theta_{JC}$	TO-251/TO-252	$^\circ\text{C/W}$	
			TO-252D		0.6
			TO-263		0.5
			DFN-8(5x6)		6

- Notes: 1. Maximum under Steady State conditions is  $90^\circ\text{C/W}$ .  
 2. Surface Mounted on 1" x1" FR4 board.

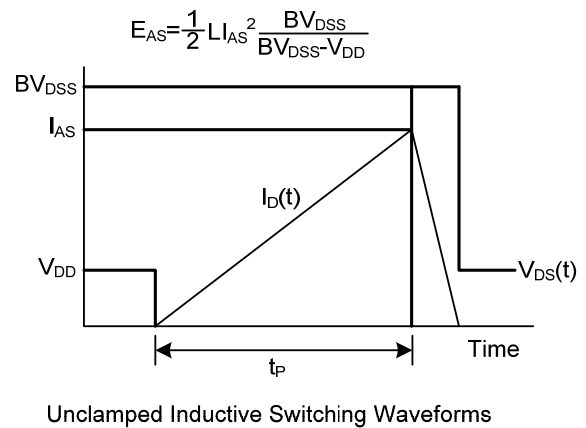
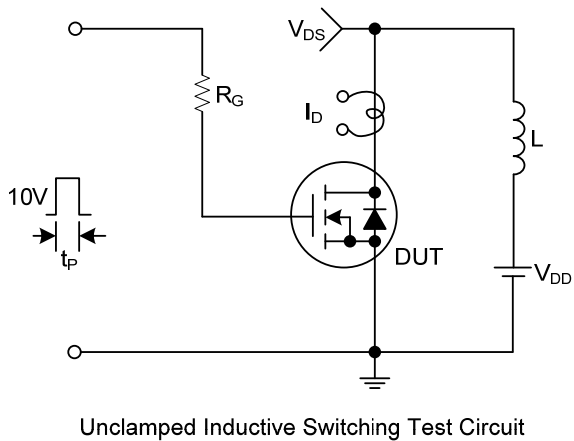
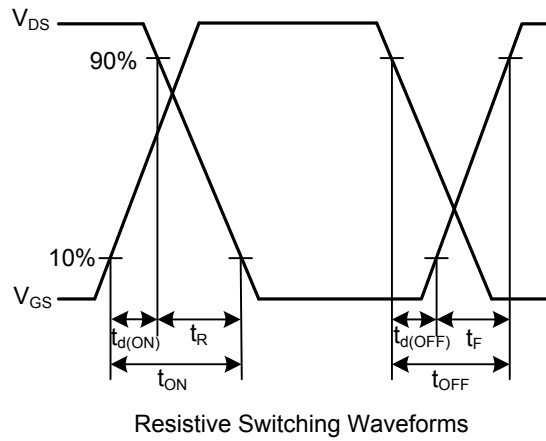
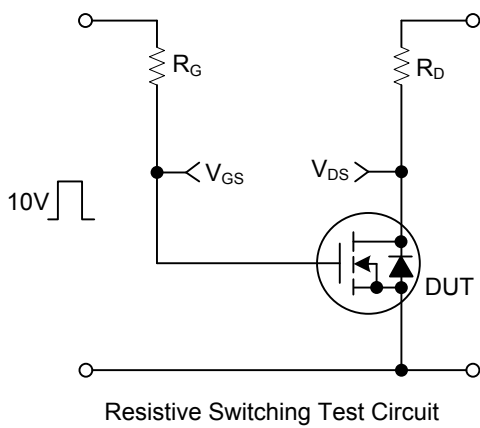
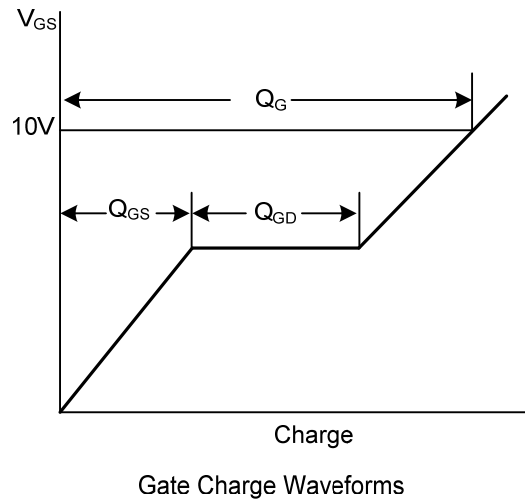
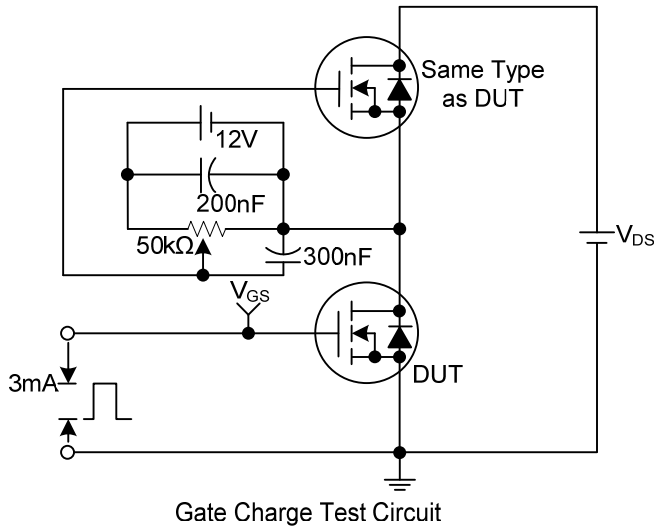
■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise noted)

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	30			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V			1	μA
		V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C			10	μA
Gate-Source Leakage Current	Forward	V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V			+100	nA
	Reverse	V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V			-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	1.5		2.5	V
Static Drain-Source On-State Resistance (Note 1)	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =28.8A		2.4	4.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =27A		2.7	5.5	mΩ
Forward Transconductance (Note 1)	g <sub>FS</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =28.8A		160		S
On State Drain Current (Note 1)	I <sub>D(ON)</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> ≥5V	90			A
<b>DYNAMIC PARAMETERS (Note 2)</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1.0MHz		12065		pF
Output Capacitance	C <sub>OSS</sub>			1725		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			970		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =10V, I <sub>D</sub> =28.8A		171	257	nC
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =28.8A		81.5	123	nC
Gate to Source Charge	Q <sub>GS</sub>			34		nC
Gate to Drain Charge	Q <sub>GD</sub>			29		nC
Gate Resistance	R <sub>G</sub>	f=1MHz		1.4	2.1	Ω
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =15V, R <sub>L</sub> =0.625Ω, I <sub>D</sub> =24A, V <sub>GEN</sub> =10V, R <sub>G</sub> =1Ω		18	27	ns
Rise Time	t <sub>R</sub>			11	17	ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			70	105	ns
Fall-Time	t <sub>F</sub>			10	15	ns
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =15V, R <sub>L</sub> =0.67Ω, I <sub>D</sub> =22.5A, V <sub>GEN</sub> =4.5V, R <sub>G</sub> =1Ω		55	83	ns
Rise Time	t <sub>R</sub>			180	270	ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			55	83	ns
Fall-Time	t <sub>F</sub>			12	18	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>	T <sub>C</sub> =25°C			90	A
Maximum Body-Diode Pulsed Current (Note 1)	I <sub>SM</sub>				90	A
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =22A		0.8	1.2	V
Body Diode Reverse Recovery Time	t <sub>RR</sub>	I <sub>F</sub> =20A, di/dt=100A/μs, T <sub>J</sub> =25°C		52	78	ns

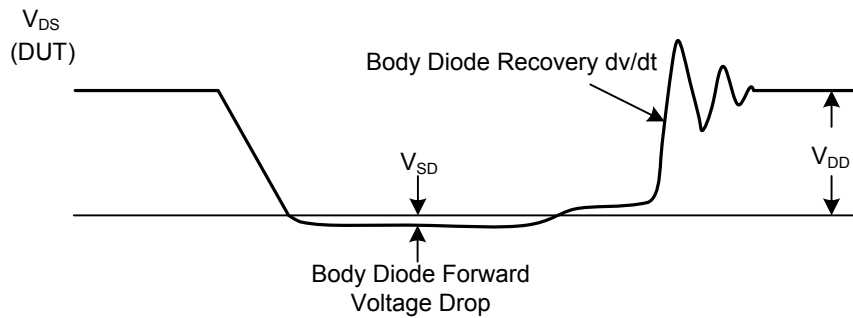
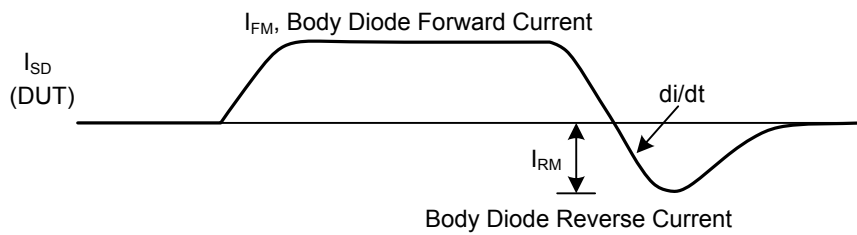
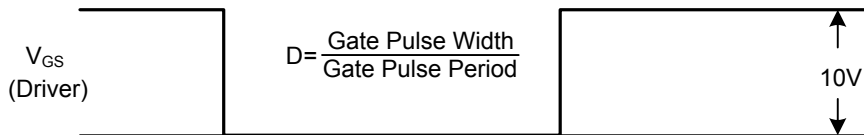
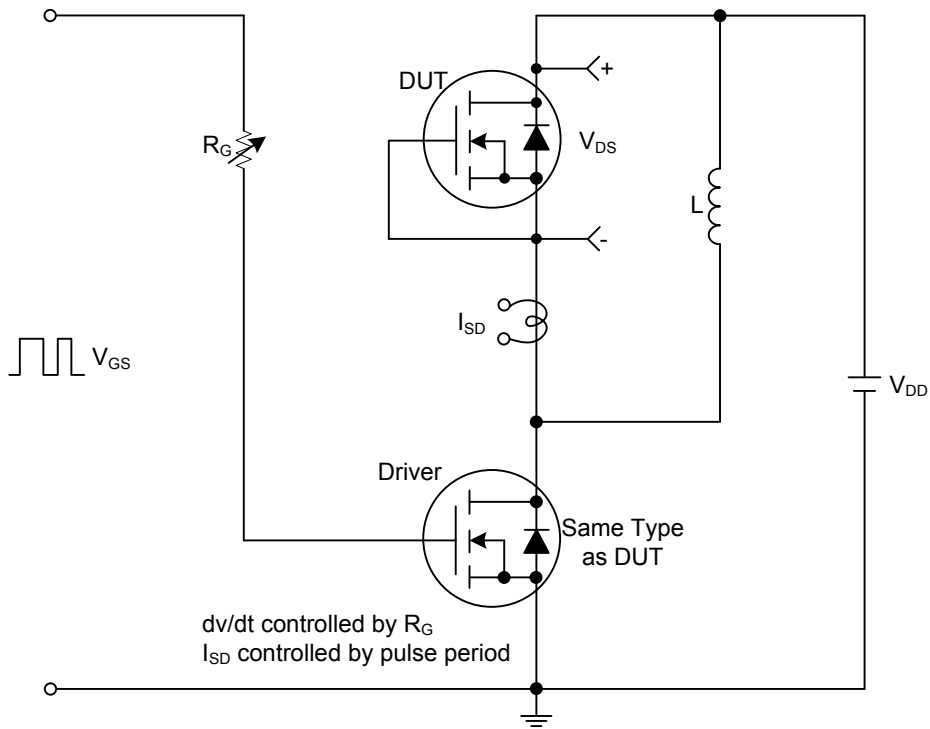
Notes: 1. Pulse Test: Pulse width≤300μs, Duty cycles≤2%.

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

## ■ TEST CIRCUITS AND WAVEFORMS

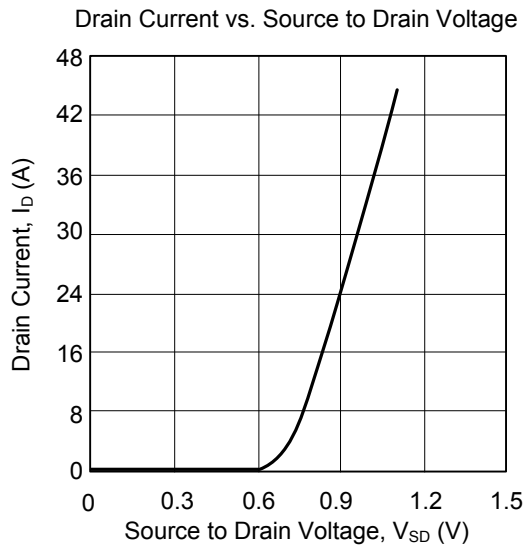


■ TEST CIRCUITS AND WAVEFORMS(Cont.)



Peak Diode Recovery dv/dt Test Circuit and Waveforms

■ TYPICAL CHARACTERISTICS



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.