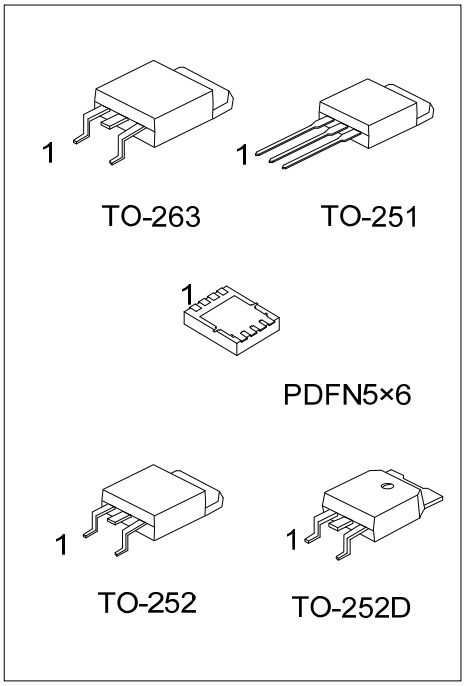
90A, 30V N-CHANNEL(D-S) POWER MOSFET



■ DESCRIPTION

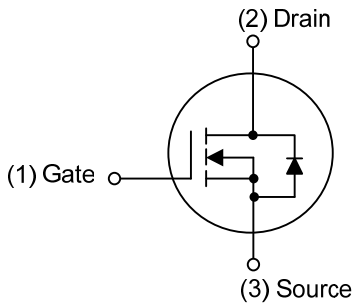
The UTC **UT90N03** is a N-channel enhancement mode Power FET, it uses UTC's advanced technology to provide customers a minimum on-state resistance.

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

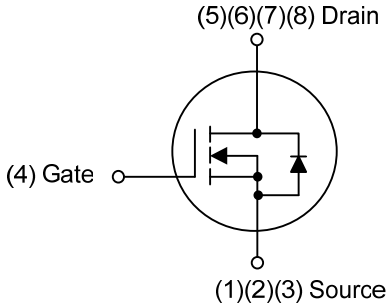
■ FEATURES

* $R_{DS(ON)}$ ≤ 4.5 mΩ @ V_{GS}=10V, I_D=28.8A
  $R_{DS(ON)}$ ≤ 5.5 mΩ @ V_{GS}=4.5V, I_D=27A
* Improved dv/dt capability

■ SYMBOL



TO-251/TO-252
TO-252D/TO-263



SOP-8/PDFN5×6

■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT90N03L-TM3-T	UT90N03G-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
UT90N03L-TN3-R	UT90N03G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UT90N03L-TND-R	UT90N03G-TND-R	TO-252D	G	D	S	-	-	-	-	-	Tape Reel
UT90N03L-TQ2-T	UT90N03G-TQ2-T	TO-263	G	D	S	-	-	-	-	-	Tube
UT90N03L-TQ2-R	UT90N03G-TQ2-R	TO-263	G	D	S	-	-	-	-	-	Tape Reel
UT90N03L-P5060-R	UT90N03G-P5060-R	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

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

UT90N03G-TM3-T
(1)Packing Type
(2)Package Type
(3)Green Package

(1) T: Tube, R: Tape Reel
(2) TM3: TO-251, TN3: TO-252, TND: TO-252D
TQ2: TO-263, P5060: PDFN5×6
(3) G: Halogen Free and Lead Free, L: Lead Free

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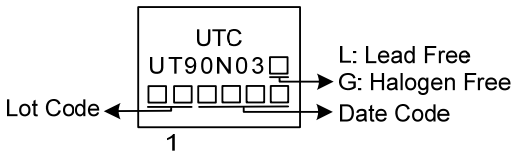
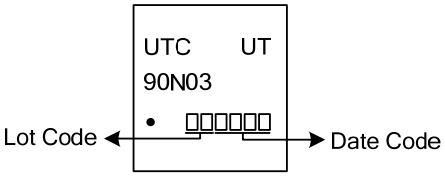
■ MARKING

TO-251 / TO-252 / TO-252D / TO-263	PDFN5×6
	

■ ABSOLUTE MAXIMUM RATINGS (T_A=25°C, unless otherwise noted)

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	±20	V
Drain Current		T_C=25°C (Note 2, 5)	I_D	90	A
		T_A=25°C (Note 3, 4)		28.8	A
		Pulsed	I_{DM}	90	A
Avalanche Current Pulse (L=0.074mH)			I_{AS}	90	A
Single Pulsed Avalanche Energy (L=0.074mH)			E_{AS}	300	mJ
Continuous Source-Drain Diode Current		T_C=25°C (Note 2, 5)	I_S	90	A
		T_A=25°C (Note 3, 4)		3.13	A
Power Dissipation	T_C=25°C (Note 2)	TO-251/TO-252 TO-252D	P_D	187	W
		TO-263		220	
		PDFN5×6		21	
	T_A=25°C (Note 3, 4)			3.75	W
Junction Temperature			T_J	-55 ~ +150	°C
Storage Temperature Range			T_{STG}	-55 ~ +150	°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°C.
3. Surface Mounted on 1"x1" FR4 board.
4. t=10sec.
5. Calculated based on maximum junction temperature. Package limitation current is 90A.

■ THERMAL DATA

PARAMETER			SYMBOL	RATINGS	UNIT
Junction to Ambient (Note 1, 2)	t≤10sec	TO-251/TO-252 TO-252D/TO-263	θ_{JA}	40	°C/W
		PDFN5×6		40.3	
Junction to Case	Steady State	TO-251/TO-252 TO-252D	θ_{JC}	0.6	°C/W
		TO-263		0.5	
		PDFN5×6		6	

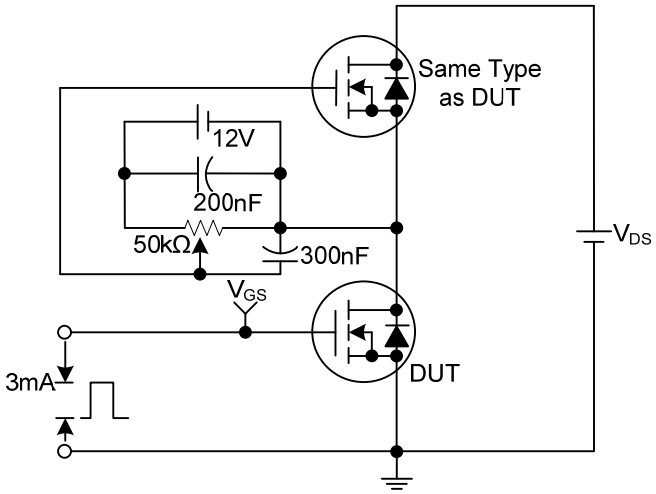
Notes: 1. Maximum under Steady State conditions is 90°C/W.
2. Surface Mounted on 1" x1" FR4 board.

■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise noted)

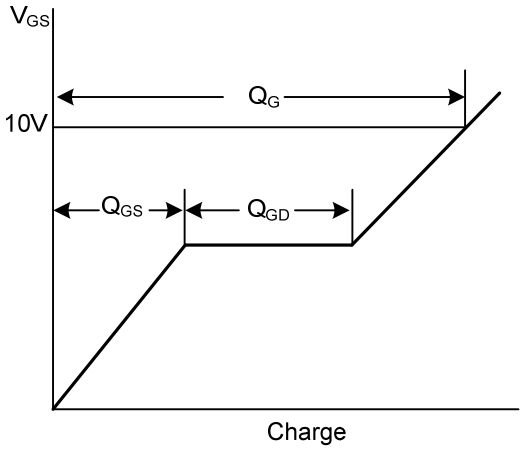
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	30			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=30V, V_{GS}=0V			1	μA
			V_{DS}=30V, V_{GS}=0V, T_J=55°C			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	1.5		2.5	V
Static Drain-Source On-State Resistance (Note 1)		$R_{DS(ON)}$	V_{GS}=10V, I_D=28.8A		2.4	4.5	mΩ
			V_{GS}=4.5V, I_D=27A		2.7	5.5	mΩ
Forward Transconductance (Note 1)		g_{FS}	V_{DS}=15V, I_D=28.8A		160		S
On State Drain Current (Note 1)		$I_{D(ON)}$	V_{GS}=10V, V_{DS}≥5V	90			A
DYNAMIC PARAMETERS (Note 2)							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=15V, f=1.0MHz		4500		pF
Output Capacitance		C_{OSS}			1400		pF
Reverse Transfer Capacitance		C_{RSS}			700		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DS}=15V, V_{GS}=10V, I_D=28.8A		171	257	nC
Total Gate Charge		Q_G	V_{DS}=15V, V_{GS}=4.5V, I_D=28.8A		81.5	123	nC
Gate to Source Charge		Q_{GS}			34		nC
Gate to Drain Charge		Q_{GD}			29		nC
Gate Resistance		R_G	f=1MHz		1.4	2.1	Ω
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=15V, R_L=0.625Ω, I_D=24A, V_{GEN}=10V, R_G=1Ω		18	27	ns
Rise Time		t_R			11	17	ns
Turn-OFF Delay Time		$t_{D(OFF)}$			70	105	ns
Fall-Time		t_F			10	15	ns
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=15V, R_L=0.67Ω, I_D=22.5A, V_{GEN}=4.5V, R_G=1Ω		55	83	ns
Rise Time		t_R			180	270	ns
Turn-OFF Delay Time		$t_{D(OFF)}$			55	83	ns
Fall-Time		t_F			12	18	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S	T_C=25°C			90	A
Maximum Body-Diode Pulsed Current (Note 1)		I_{SM}				90	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=22A		0.8	1.2	V
Body Diode Reverse Recovery Time		t_{rr}	I_F=20A, di/dt=100A/μs, T_J=25°C		52	78	ns

Notes: 1. Pulse Test: Pulse width≤300μs, Duty cycle≤2%.
2. Guaranteed by design, not subject to production testing.

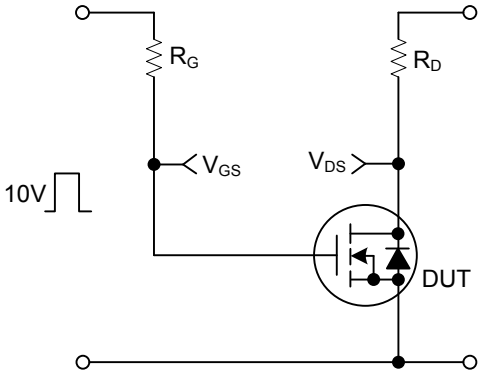
■ TEST CIRCUITS AND WAVEFORMS



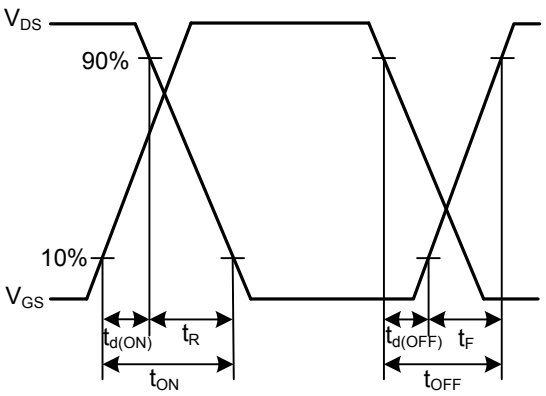
Gate Charge Test Circuit



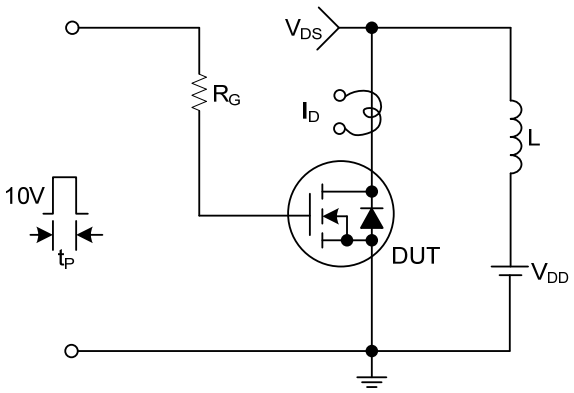
Gate Charge Waveforms



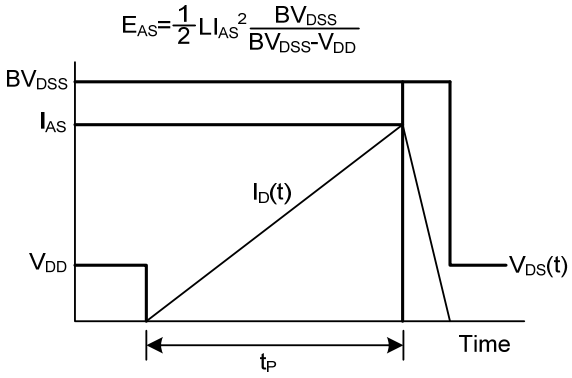
Resistive Switching Test Circuit



Resistive Switching Waveforms

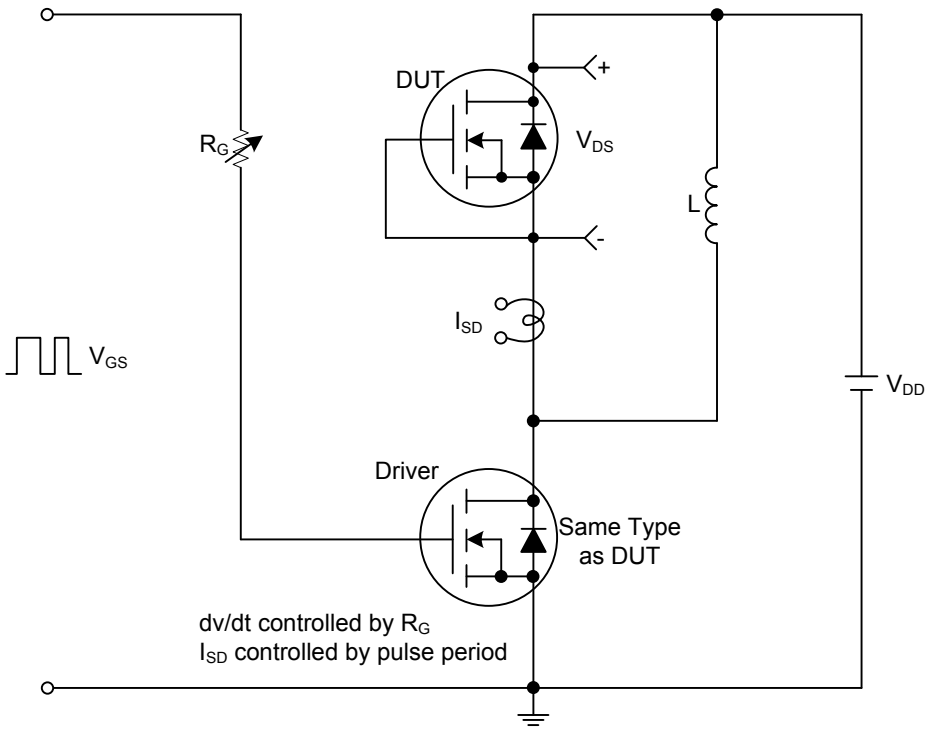


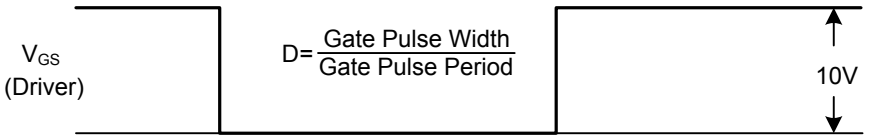
Unclamped Inductive Switching Test Circuit

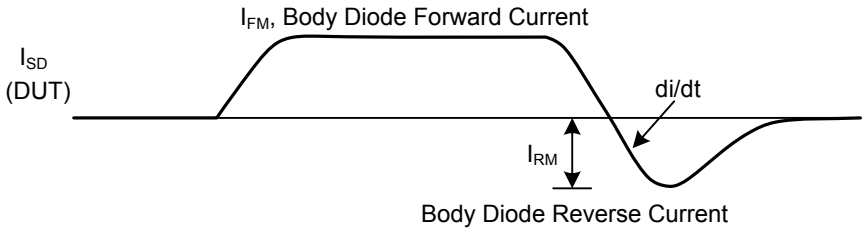


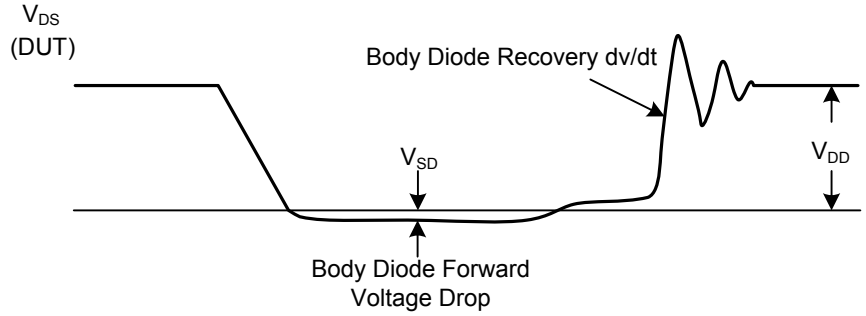
Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS(Cont.)





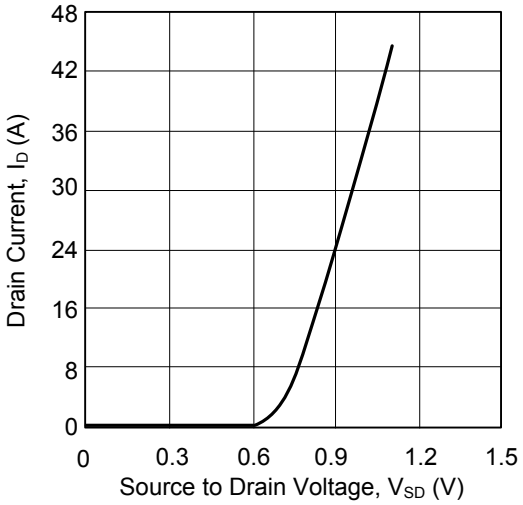




Peak Diode Recovery dv/dt Test Circuit and Waveforms

■ TYPICAL CHARACTERISTICS

Drain Current vs. Source to Drain Voltage



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