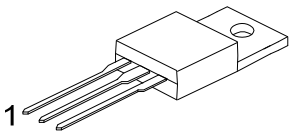
90A, 30V N-CHANNEL ENHANCEMENT MODE POWER MOSFET



TO-220

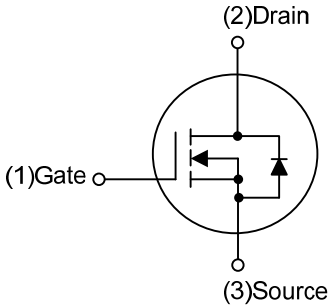
■ DESCRIPTION

The UTC **UT90N03M** is a N-channel power MOSFET providing very low on-resistance. It has high efficiency and perfect cost-effectiveness. It can be generally applied in the commercial and industrial fields.

■ FEATURES

* $R_{DS(ON)} \leq 4.5\ m\Omega$ @ $V_{GS} = 10V$, $I_D = 45A$
  $R_{DS(ON)} \leq 5.5\ m\Omega$ @ $V_{GS} = 4.5V$, $I_D = 30A$
* Improved dv/dt capability
* Simple drive requirement

■ SYMBOL



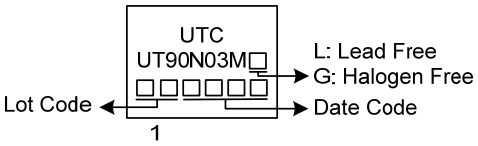
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UT90N03ML-TA3-T	UT90N03MG-TA3-T	TO-220	G	D	S	Tube

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

UT90N03MG-TA3-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube (2) TA3: TO-220 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATING (T_C=25°C unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	30	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	DC	I_D	90	A
	Pulsed (Note 2)	I_{DM}	180	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	49	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.44	V/ns
Power Dissipation		P_D	220	W
Junction Temperature		T_J	+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. Repetitive Rating: Pulse width limited by maximum junction temperature
3. L = 0.1mH, I_{AS} = 31.35A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
4. I_{SD} ≤ 30A, di/dt ≤ 200A/μs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 25°C

■ THERMAL DATA

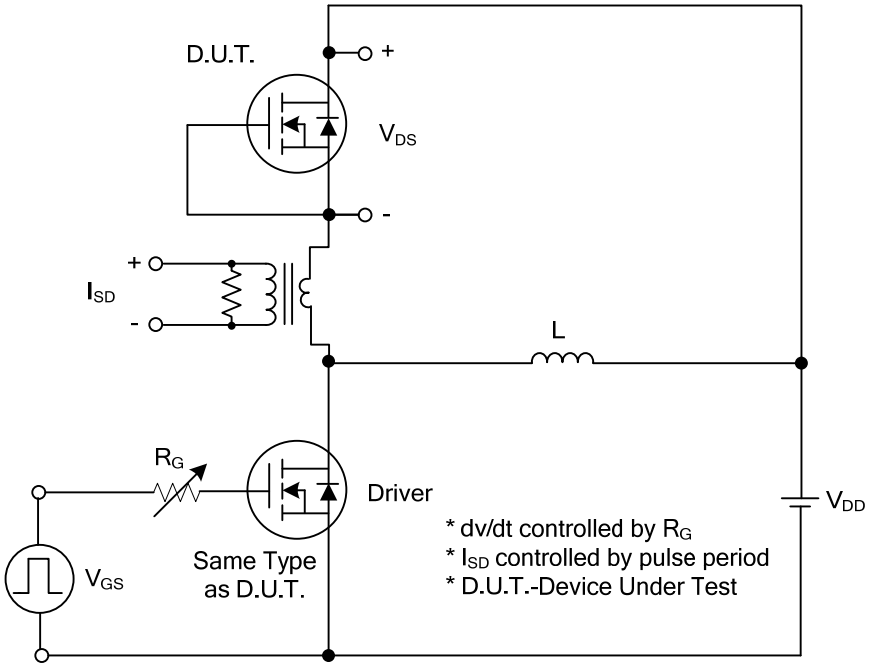
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	°C/W
Junction to Case	θ_{JC}	0.5	°C/W

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

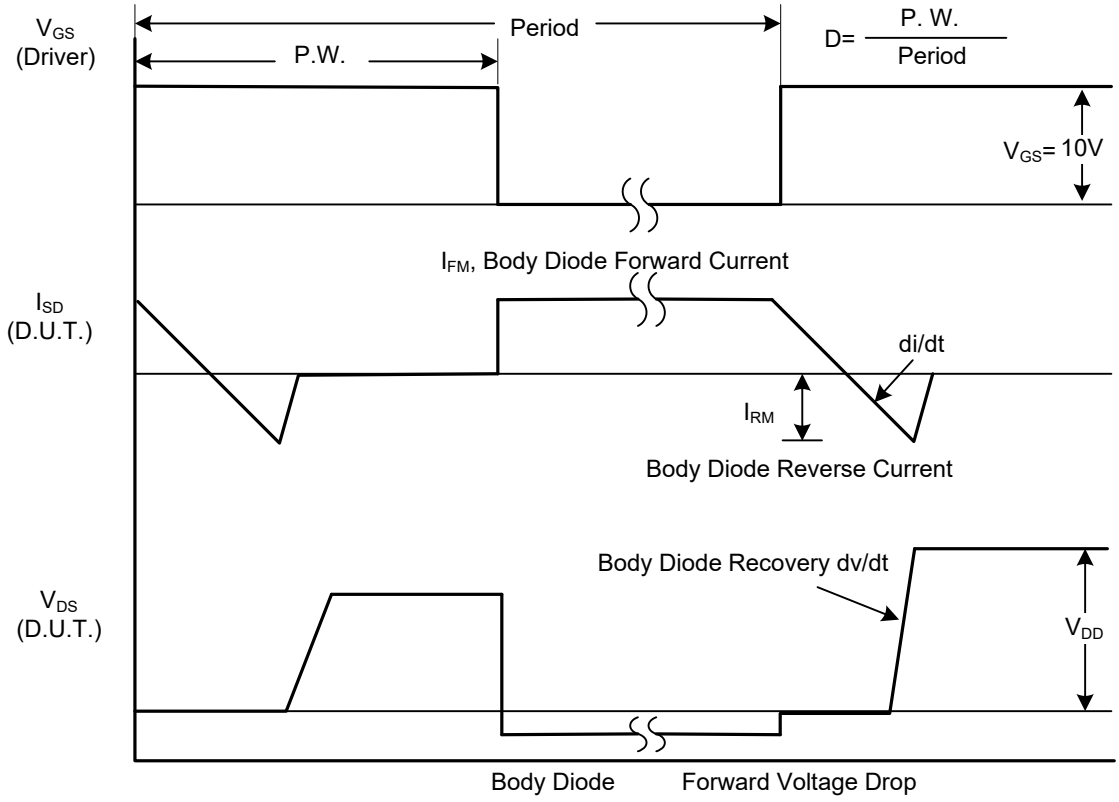
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	30			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=30V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}= V_{GS}, I_D=250μA	1.0		3.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS} =10V, I_D=45A			4.5	mΩ
			V_{GS} =4.5V, I_D=30A			5.5	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=15V, f=1.0MHz		3078		pF
Output Capacitance		C_{OSS}			580		pF
Reverse Transfer Capacitance		C_{RSS}			512		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DS}=24V, V_{GS}=10V, I_D=90A (Note 1, 2)		103		nC
Gate to Source Charge		Q_{GS}			15		nC
Gate to Drain Charge		Q_{GD}			27		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=15V, V_{GS}=10V, I_D=90A, R_G=3.3Ω (Note 1, 2)		8		ns
Rise Time		t_R			18		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			84		ns
Fall-Time		t_F			58		ns
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I_S				90	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				180	A
Diode Forward Voltage		V_{SD}	I_F=90A, V_{GS}=0V			1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	I_S=30A, V_{GS}=0V, dI_F/dt =100A/μs		295		nS
Reverse Recovery Charge		Q_{rr}			976		nC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

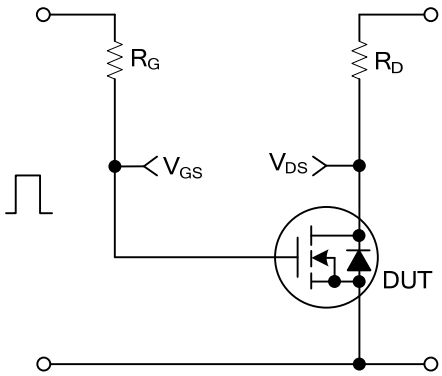


Peak Diode Recovery dv/dt Test Circuit

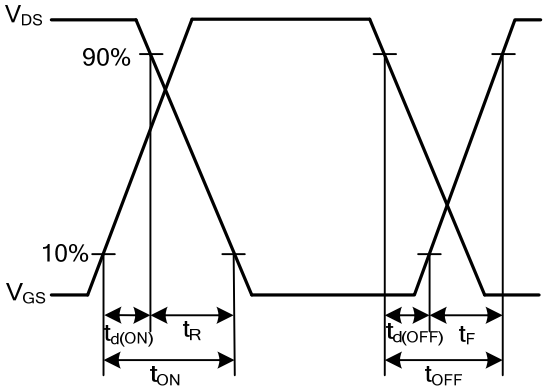


Peak Diode Recovery dv/dt Waveforms

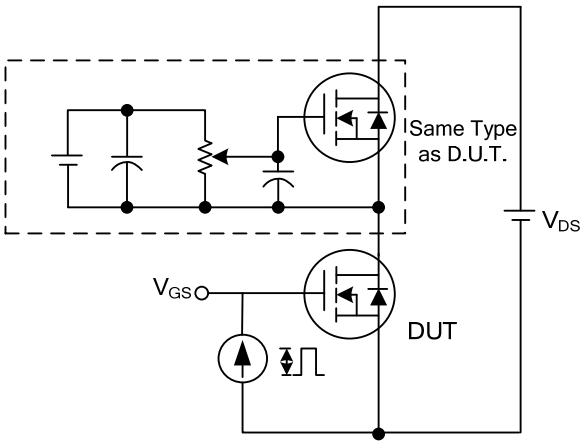
■ TEST CIRCUITS AND WAVEFORMS



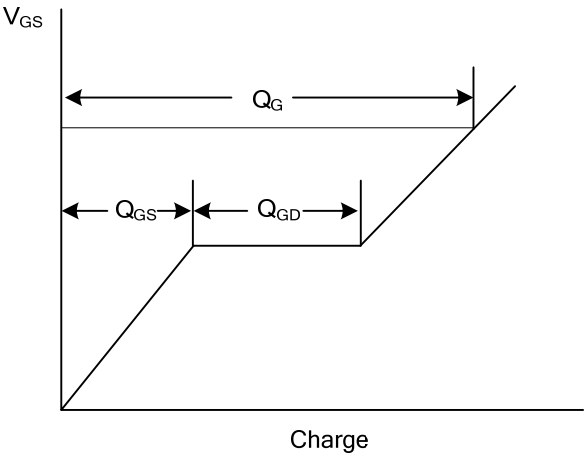
itching Test Circuit



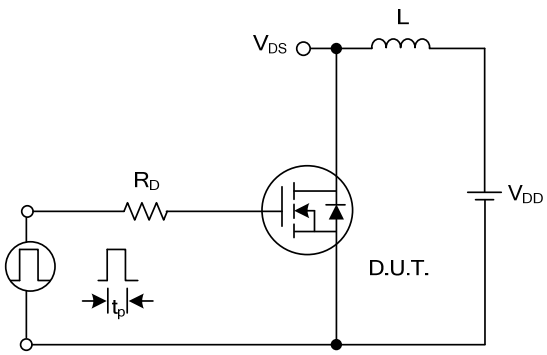
Switching Waveforms



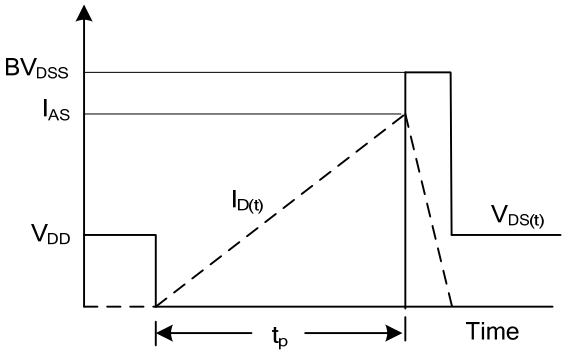
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms