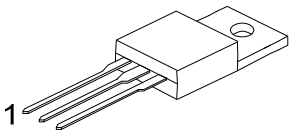
150A, 50V N-CHANNEL POWER MOSFET



TO-220

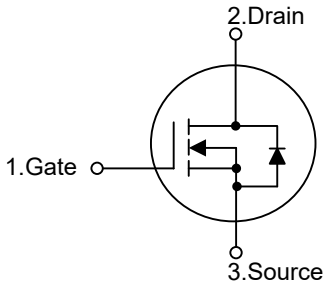
■ DESCRIPTION

The UTC **UT150N05M** is an N-channel enhancement mode Power FET, it uses UTC's advanced technology to provide customers a minimum on-state resistance and high switching speed.

■ FEATURES

* $R_{DS(ON)} \leq 2.9\ m\Omega$ @ V_{GS}=10V, I_D=75A
  $R_{DS(ON)} \leq 3.8\ m\Omega$ @ V_{GS}=4.5V, I_D=50A
* High switching speed
* Improved dv/dt capability

■ SYMBOL



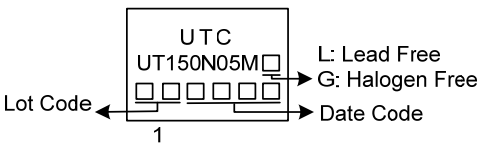
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UT150N05ML-TA3-T	UT150N05MG-TA3-T	TO-220	G	D	S	Tube

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

UT150N05MG-TA3-T (1)Packing Type	(1) T: Tube
(2)Package Type	(2) TA3: TO-220
(3)Green Package	(3) G: Halogen Free and Lead Free L: Lead Free

■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	50	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous	I_D	150	A
	Pulsed	I_{DM}	300	A
Avalanche Energy	Single Pulsed	E_{AS}	320	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	1.1	V/ns
Power Dissipation		P_D	250	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}=80A, V_{DD}=25V, R_G=25Ω, Starting T_J = 25°C
4. I_{SD} ≤ 30A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

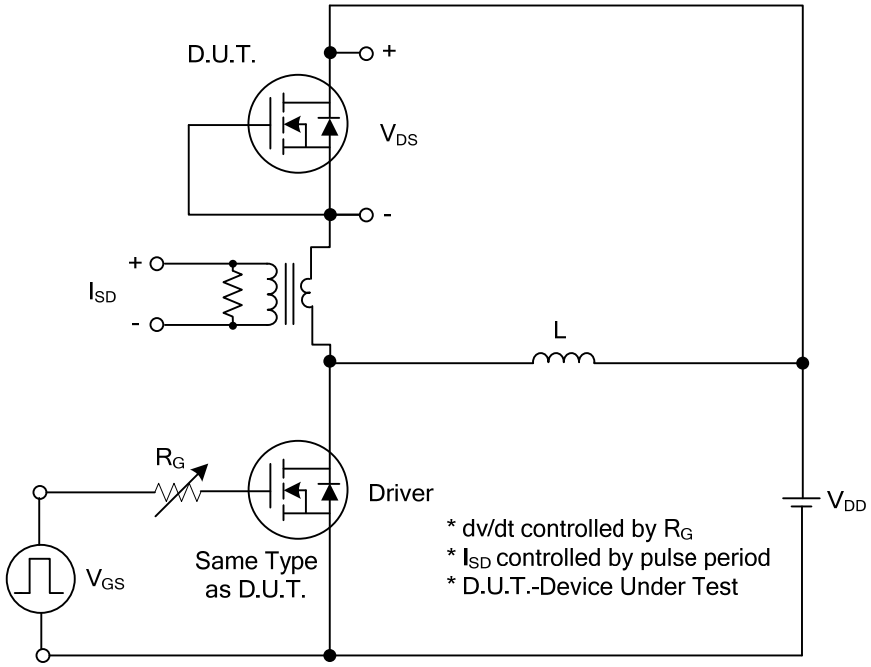
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	°C/W
Junction to Case	θ_{JC}	0.5	°C/W

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

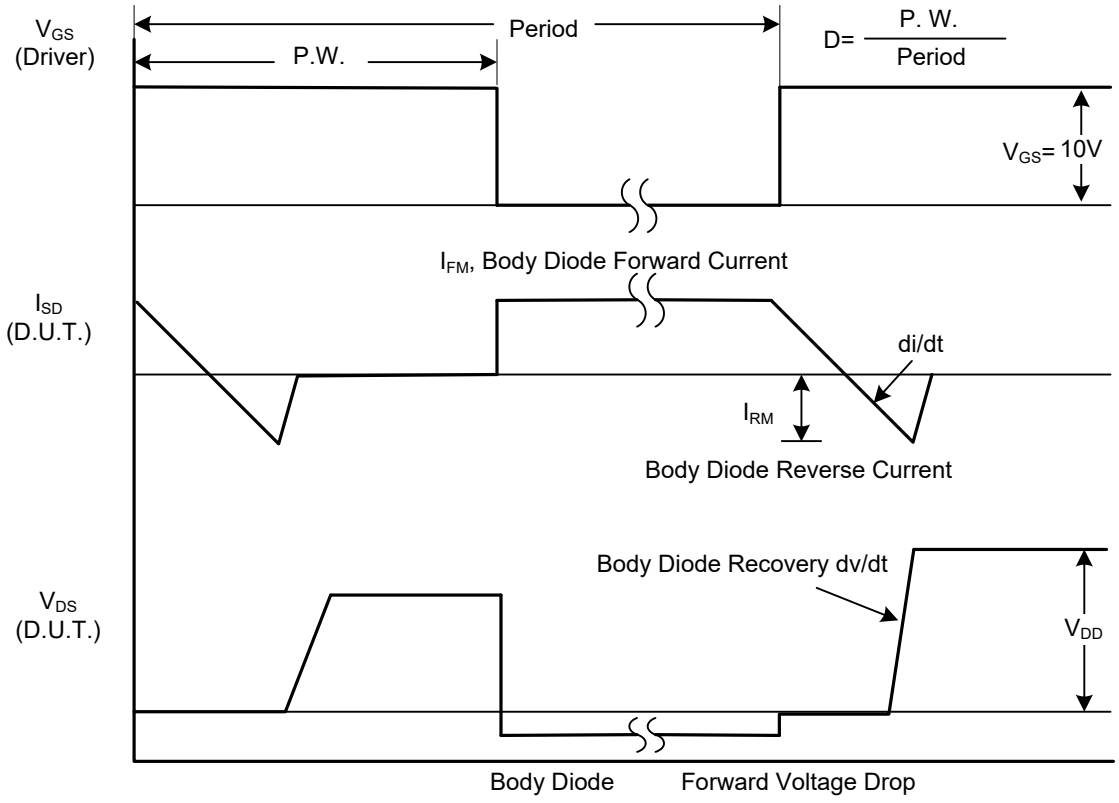
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	50			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=50V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	I_D=250μA, V_{DS}=V_{GS}	1.0		3.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=75A			2.9	mΩ
			V_{GS}=4.5V, I_D=50A			3.8	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1MHz		14200		pF
Output Capacitance		C_{OSS}			1450		pF
Reverse Transfer Capacitance		C_{RSS}			1300		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DD}=40V, V_{GS}=10V, I_D=150A (Note 1, 2)		350		nC
Gate to Source Charge		Q_{GS}			42		nC
Gate to Drain Charge		Q_{GD}			105		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=20V V_{GS}=10V, I_D=150A, R_G=3Ω (Note 1, 2)		20		ns
Rise Time		t_R			22		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			84		ns
Fall-Time		t_F			26		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				150	A
Maximum Body-Diode Pulsed Current		I_{SM}				300	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=150A			1.4	V
Reverse Recovery Time		t_{rr}	I_S =30A, V_{GS}=0V		78		nS
Reverse Recovery Charge (Note 1)		Q_{rr}	dI_F/dt=100A/μs		185		nC

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

■ TEST CIRCUITS AND WAVEFORMS

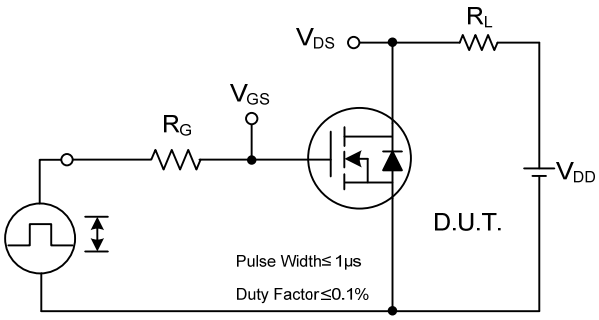


Peak Diode Recovery dv/dt Test Circuit

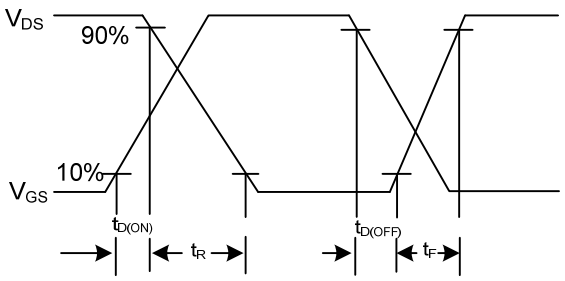


Peak Diode Recovery dv/dt Waveforms

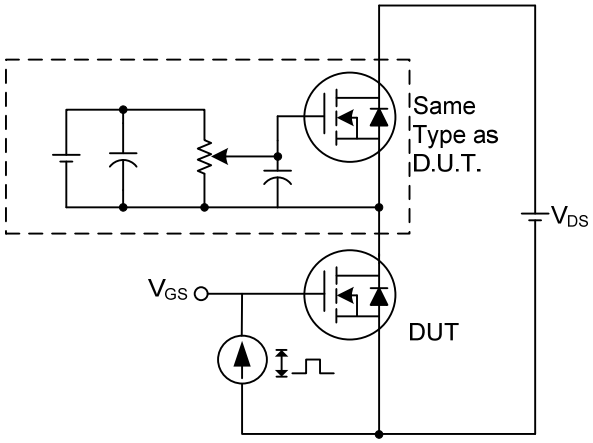
■ TEST CIRCUITS AND WAVEFORMS



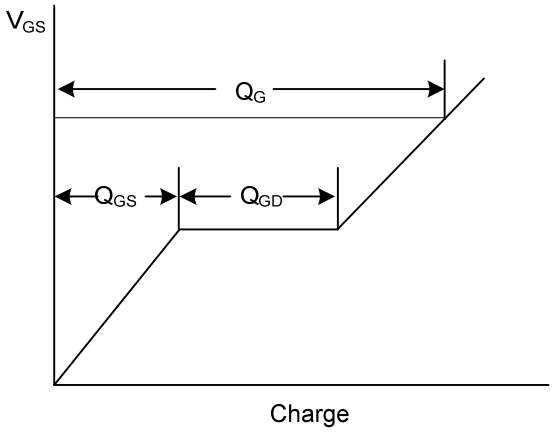
Switching Test Circuit



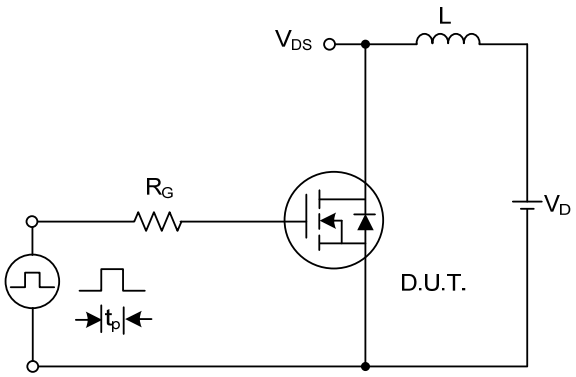
Switching Waveforms



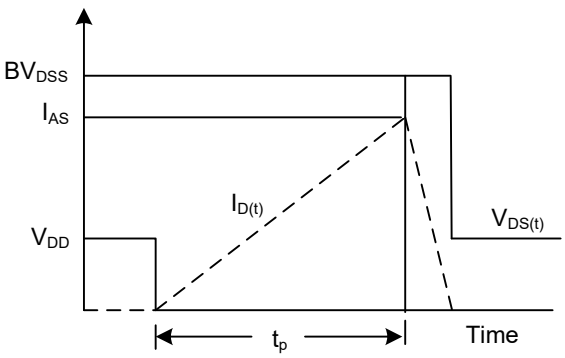
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms