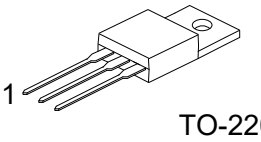
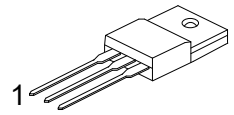
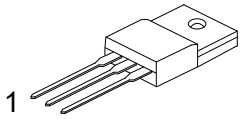
90A, 150V N-CHANNEL ENHANCEMENT MODE TRENCH POWER MOSFET



TO-220



TO-220F1



TO-220F2

■ DESCRIPTION

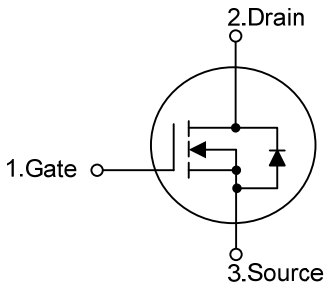
The UTC **UT90N15H** is a N-channel enhancement mode power MOSFET using UTC's advanced technology to provide customers with ideal for low voltage inverter applications.

The UTC **UT90N15H** is suitable for high efficiency synchronous rectification in SMPS, UPS, hard switched and high frequency circuits.

■ FEATURES

* $R_{DS(ON)} \leq 12\ m\Omega$ @ V_{GS}=10V, I_D=45A
* High Cell Density Trench Technology
* High Power and Current Handling Capability

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UT90N15HL-TA3-T	UT90N15HG-TA3-T	TO-220	G	D	S	Tube
UT90N15HL-TF1-T	UT90N15HG-TF1-T	TO-220F1	G	D	S	Tube
UT90N15HL-TF2-T	UT90N15HG-TF2-T	TO-220F2	G	D	S	Tube

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

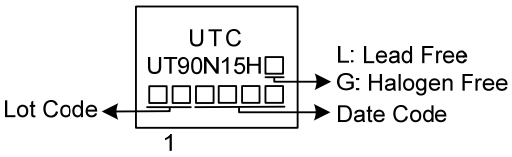
UT90N15HG-TA3-T

(1)Packing Type — (1) T: Tube

(2)Package Type — (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2

(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}	150	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current	Continuous	I_D	90	A
Pulsed Drain Current	Pulsed (Note 2)	I_{DM}	180	A
Avalanche energy	Single Pulsed (Note 3)	E_{AS}	483	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	5.1	V/nS
Power Dissipation	TO-220	P_D	257	W
	TO-220F1/TO-220F2		49	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} = 98.3A, V_{DD} = 50V, 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

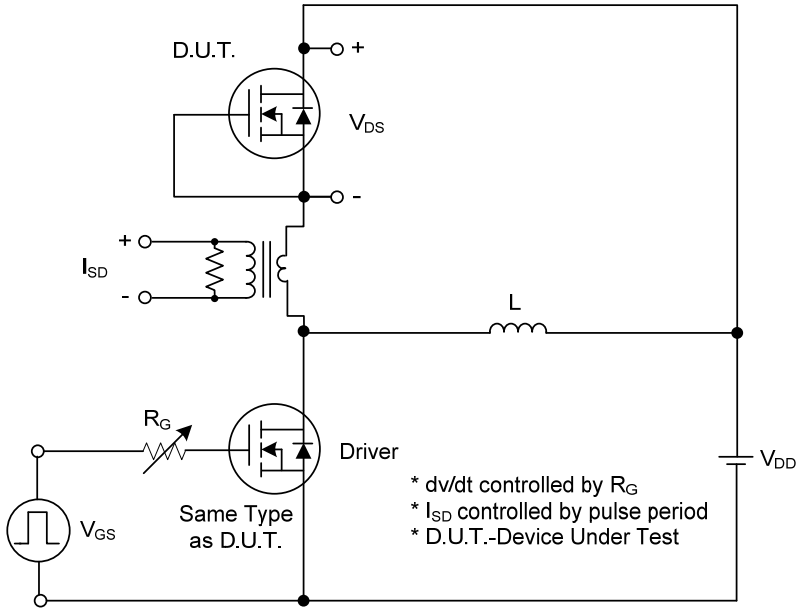
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	62.5	°C/W
Junction to Case	TO-220	θ_{JC}	0.49	°C/W
	TO-220F1/TO-220F2		2.55	°C/W

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

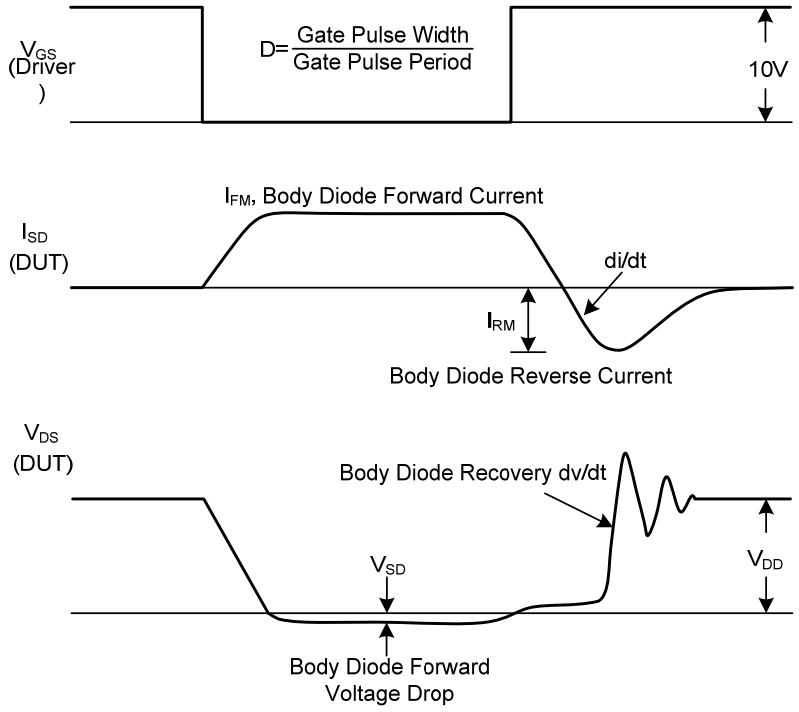
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	150			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=150V, V_{GS}=0V			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=45A			12	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		15.6		nF
Output Capacitance		C_{OSS}			753		pF
Reverse Transfer Capacitance		C_{RSS}			613		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=120V, V_{GS}=10V, I_D=90A, (Note 1, 2)		386		nC
Gate to Source Charge		Q_{GS}			85		nC
Gate to Drain Charge		Q_{GD}			196		nC
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	V_{DD}=75V, V_{GS}=10V, I_D=90A, R_G=3Ω(Note 1, 2)		52		ns
Rise Time		t_R			40		ns
Turn-off Delay Time		$t_{D(OFF)}$			207		ns
Fall-Time		t_F			49		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				90	A
Maximum Body-Diode Pulsed Current		I_{SM}				180	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=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		135		ns
Reverse recovery charge		Q_{rr}			803		nC

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

■ TEST CIRCUITS AND WAVEFORMS

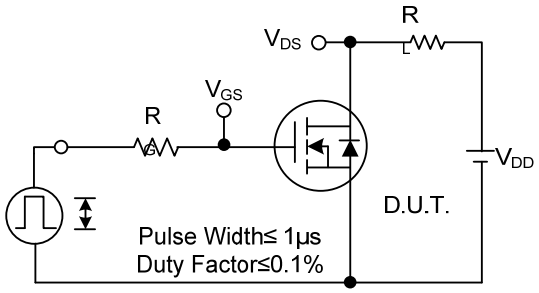


Peak Diode Recovery dv/dt Test Circuit

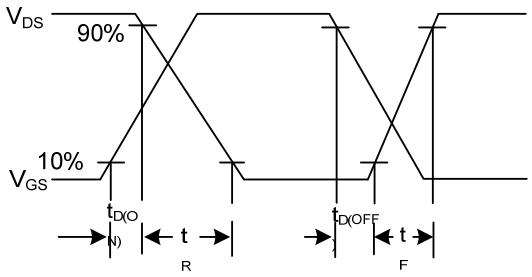


Peak Diode Recovery dv/dt Waveforms

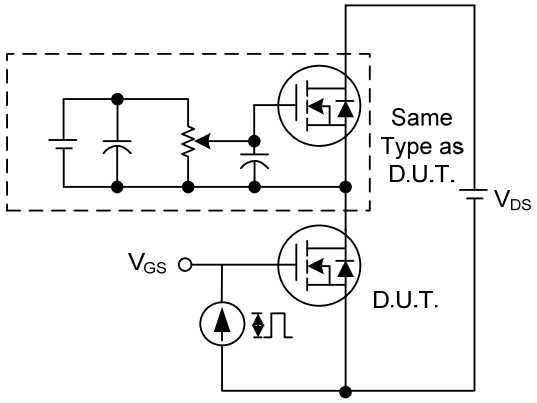
■ TEST CIRCUITS AND WAVEFORMS



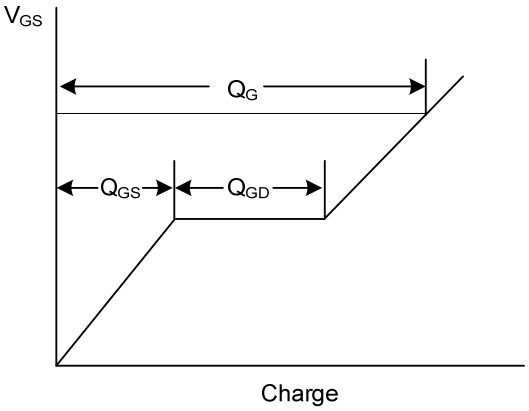
Switching Test Circuit



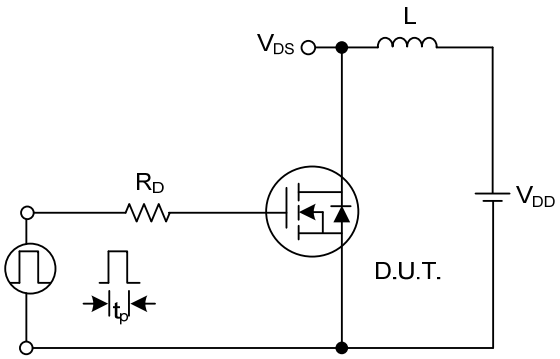
Switching Waveforms



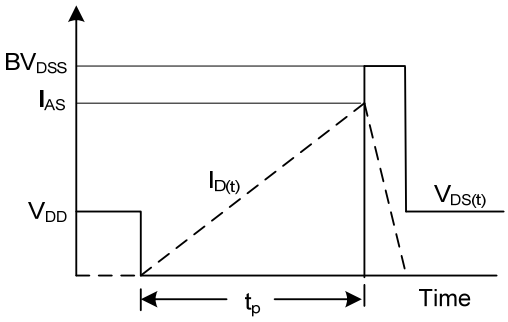
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms