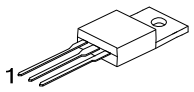
N-CHANNEL ENHANCEMENT MODE POWER MOSFET



TO-220

■ DESCRIPTION

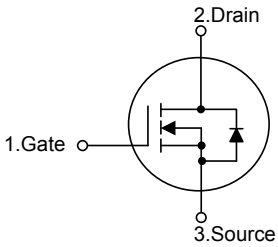
The UTC **UTT150N03** is a N-channel power MOSFET, using UTC's advanced trench technology to provide customers with a minimum on-state resistance, low gate charge and superior switching performance.

The UTC **UTT150N03** is generally applied in DC to DC convertor, synchronous or conventional switching PWM controllers.

■ FEATURES

* 150A, 30V, $R_{DS(ON)}$=4.1mΩ @ V_{GS}=10V, I_D = 75A
  $R_{DS(ON)}$=4.6mΩ @ V_{GS}=4.5V, I_D = 75A
* High Switching Speed
* High Power and Current Handling Capability
* RoHS Compliant

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTT150N03L-TA3-T	UTT150N03G-TA3-T	TO-220	G	D	S	Tube

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

UTT150N03L-TA3-T

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

■ ABSOLUTE MAXIMUM RATINGS (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	Continuous	I_D	150	A
	Pulsed	I_{DM}	266	A
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	300	mJ
Power Dissipation	Power Dissipation	P_D	160	W
	Derate above 25°C		1.07	W/°C
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55~+150	°C

Note: 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.

註解 [U1]: 设计人员根据曲线图得到的（pulse width=300us）

■ THERMAL CHARACTERISTICS

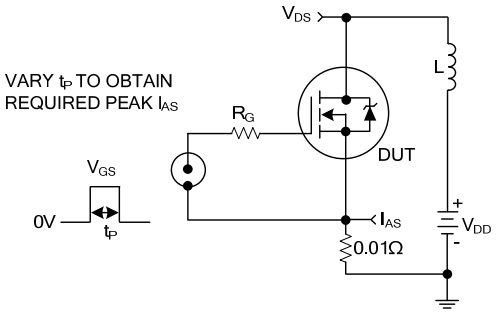
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62	°C/W
Junction to Case	θ_{JC}	0.94	°C/W

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

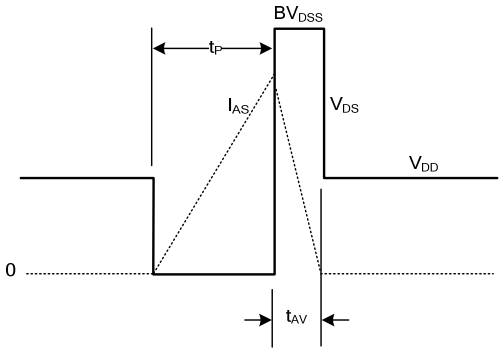
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	30			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=24V, V_{GS}=0V			1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	1		3	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=75A		3.4	4.1	mΩ
			V_{GS}=4.5V, I_D=75A		4.0	4.6	
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=15V, f=1.0MHz		5200		pF
Output Capacitance		C_{OSS}			970		pF
Reverse Transfer Capacitance		C_{RSS}			570		pF
SWITCHING PARAMETERS							
Gate Resistance		R_G	V_{GS}=0.5V, f=1MHz		2.1		Ω
Total Gate Charge		$Q_{G(TOT)}$	V_{GS}=0~10V, V_{DD}=15V, I_D=75A, I_G=1mA		106	132	nC
		$Q_{G(5)}$	V_{GS}=0~5V, V_{DD}=15V, I_D=75A, I_G=1mA		56	69	nC
Threshold Gate Charge		$Q_{G(TH)}$	V_{GS}=0~1V, V_{DD}=15V, I_D=75A, I_G=1mA		5.0	6.5	nC
Gate to Source Charge		Q_{GS}	V_{DD}=15V, I_D=75A, I_G=1mA		15		nC
Gate Charge Threshold to Plateau		Q_{GS2}			10		nC
Gate to Drain Charge		Q_{GD}			23		nC
Turn-ON Time		t_{ON}	V_{DD}=15V, I_D=75A, V_{GS}=4.5V, R_{GS}=3.3Ω			168	ns
Turn-ON Delay Time		$t_{D(ON)}$			11		ns
Rise Time		t_R			105		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			70		ns
Fall-Time		t_F			46		ns
Turn-OFF Time		t_{OFF}				173	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage		V_{SD}	I_S=150A			1.25	V
			I_S=15A			1.0	V
Body Diode Reverse Recovery Time		t_{RR}	I_{SD}=150A, dI_{SD}/dt=100A/μs			37	ns
Body Diode Reverse Recovery Charge		Q_{RR}				21	nC

Notes: 1. Package current limitation is 80A.
2. Starting T_J = 25°C, L = 0.15mH, I_{AS} = 64A, V_{DD} = 27V, V_{GS}=10V
3. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%

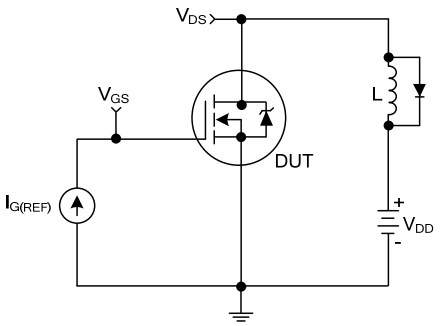
■ TEST CIRCUITS AND WAVEFORMS



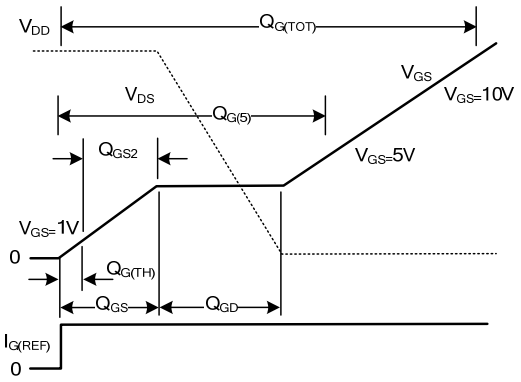
Unclamped Energy Test Circuit



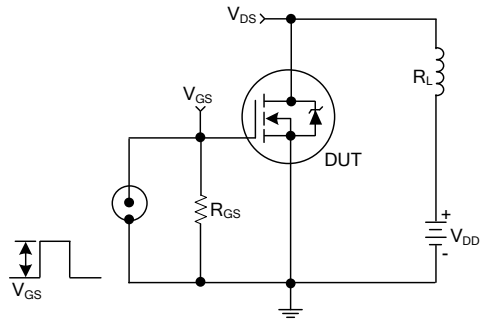
Unclamped Energy Waveforms



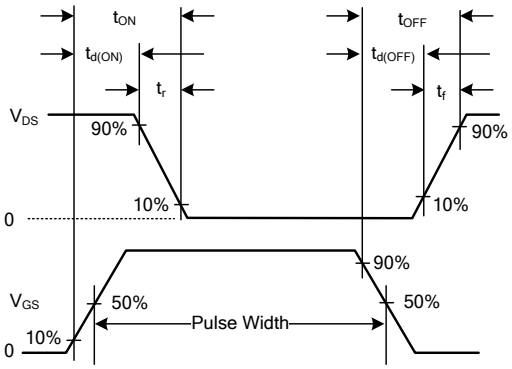
Gate Charge Test Circuit



Gate Charge Waveforms



Switching Time Test Circuit



Switching Time Waveforms