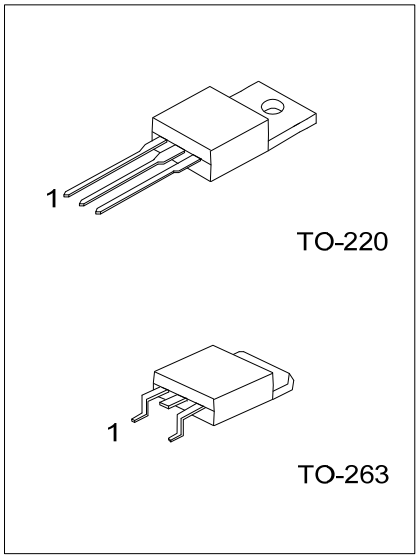
UTT220N03

Power MOSFET

220A, 30V N-CHANNEL ENHANCEMENT MODE POWER MOSFET



■ DESCRIPTION

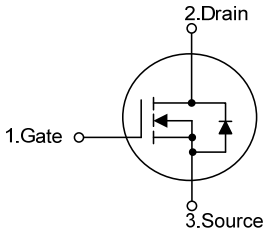
The UTC **UTT220N03** is a N-channel MOSFET, using UTC's advanced technology to provide customers with a minimum on-state resistance and superior switching performance.

The UTC **UTT220N03** is generally applied in DC to DC convertor or synchronous rectification

■ FEATURES

* $R_{DS(ON)}$ < 2.4mΩ @ V_{GS}=10V, I_D=80A
* Low Gate Charge (Typical 84nC)
* Fast Switching
* 100% Avalanche Tested
* High Power and Current Handling Capability
* RoHS Compliant

■ SYMBOL



■ ORDERING INFORMATION

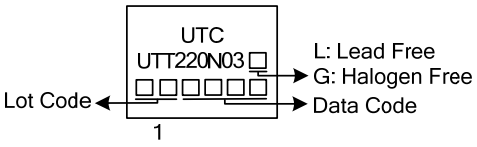
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTT220N03L-TA3-T	UTT220N03G-TA3-T	TO-220	G	D	S	Tube
UTT220N03L-TQ2-T	UTT220N03G-TQ2-T	TO-263	G	D	S	Tube
UTT220N03L-TQ2-R	UTT220N03G-TQ2-R	TO-263	G	D	S	Tape Reel

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

UTT220N03G-TA3-T

(1)Packing Type	(1) T: Tube, R: Tape Reel
(2)Package Type	(2) TA3: TO-220, TQ2: TO-263
(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (Note 6) (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 (T_C=25°C)	I_D	220	A
	T_C=100°C		170	A
	Pulsed (Note 1)	I_{DM}	876	A
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	864	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	6.0	V/ns
Power Dissipation	T_C=25°C	P_D	214	W
	T_C=100°C		100	W
	Derate above 25°C		1.43	W/°C
Junction Temperature		T_J	-55 ~ +175	°C
Storage Temperature		T_{STG}	-55 ~ +175	°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.

■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	°C/W
Junction to Case	θ_{JC}	0.7	°C/W

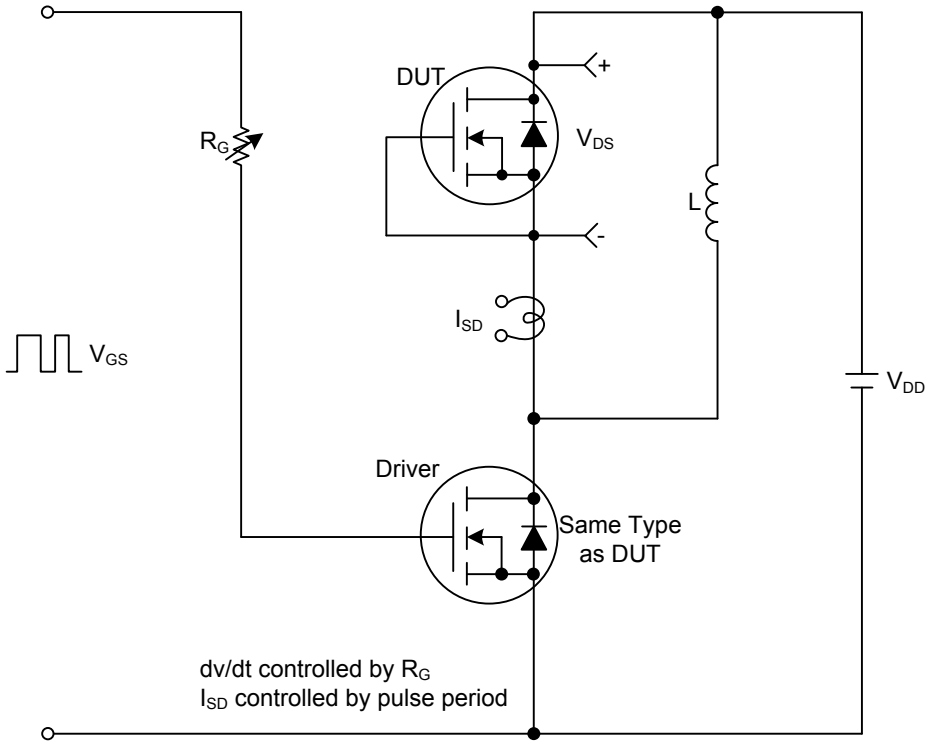
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise noted)

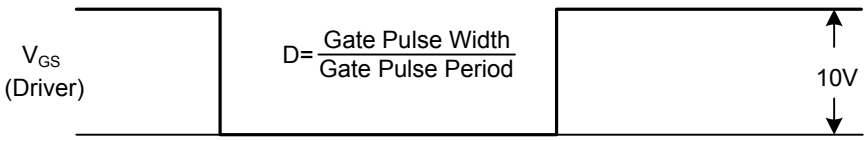
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V, T_C=25°C	30			V
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	Reference to 25°C, I_D=250μA		30		mV/°C
Drain-Source Leakage Current		I_{DSS}	V_{DS}=32V, 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	1.0		3.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=80A		2.0	2.4	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		5490	7300	pF
Output Capacitance		C_{OSS}			1220	1620	pF
Reverse Transfer Capacitance		C_{RSS}			155	233	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{GS}=10V, V_{DS}=30V, I_D=1.3A (Note 4, 5)		200	220	nC
Gate to Source Charge		Q_{GS}			19		nC
		Q_{GS2}			9.5		nC
Gate to Drain Charge		Q_{GD}			12		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=30V, I_D=0.5A, R_{GEN}=4.7Ω, V_{GS}=10V (Note 4, 5)		58	70	ns
Rise Time		t_R			260	310	ns
Turn-OFF Delay Time		$t_{D(OFF)}$			1810	1860	ns
Fall-Time		t_F			987	1160	ns
Equivalent Series Resistance (G-S)		ESR			1.1		Ω
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				219	A
Maximum Body-Diode Pulsed Current		I_{SM}				876	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=80A, V_{GS}=0V			1.3	V
Body Diode Reverse Recovery Time		t_{rr}	I_S=80A, V_{GS}=0V, dI_F/dt=100A/μs (Note 4)		54		ns
Body Diode Reverse Recovery Charge		Q_{rr}			49		nC

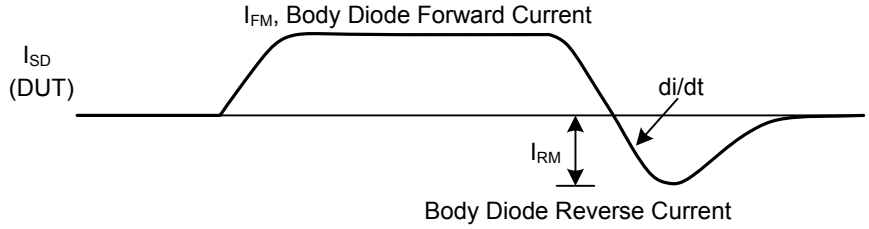
Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 3mH, I_{AS} = 24A, V_{DD} = 30V, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 80A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature.

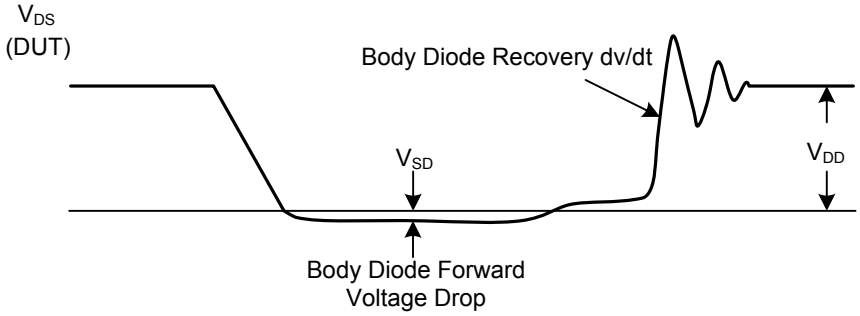
■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & Waveforms



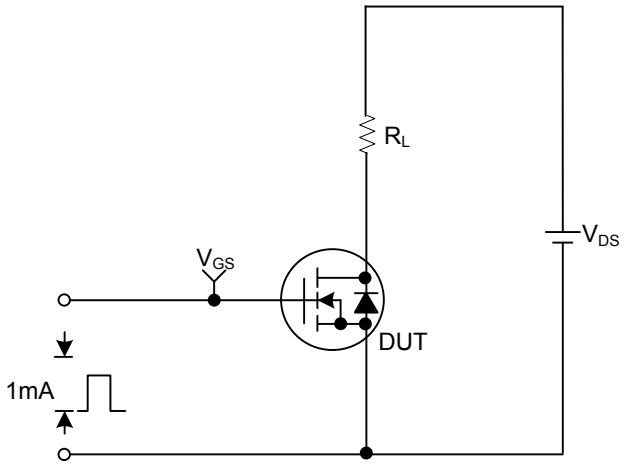




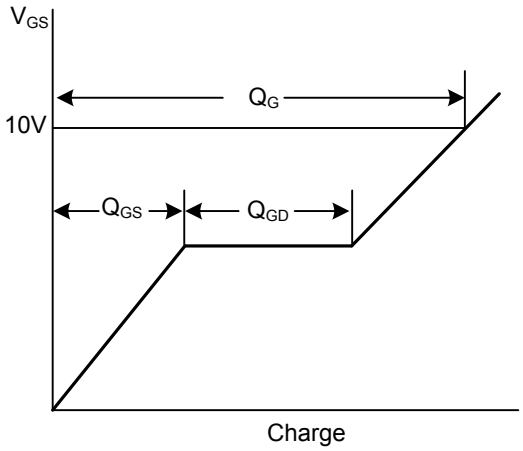


■ TEST CIRCUITS AND WAVEFORMS(Cont.)

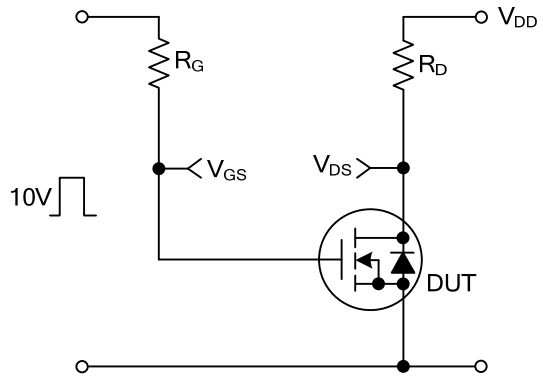
Gate Charge Test Circuit



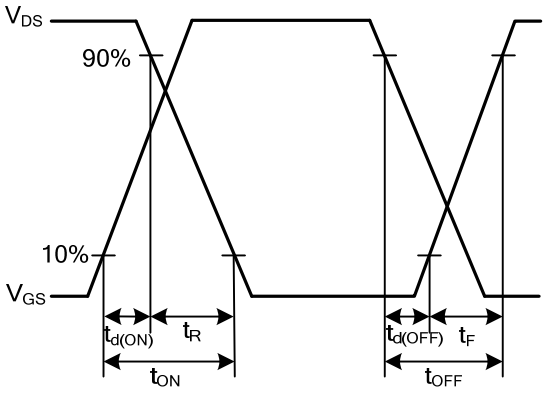
Gate Charge Waveforms



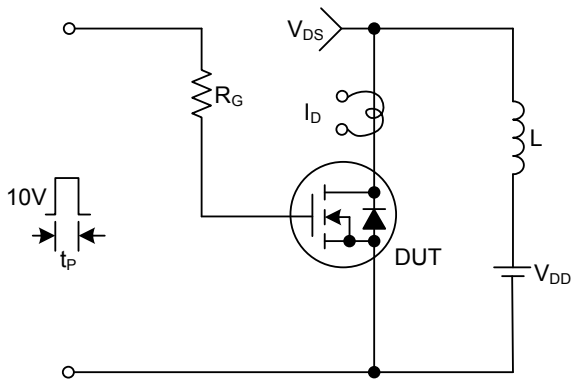
Resistive Switching Test Circuit



Resistive Switching Waveforms

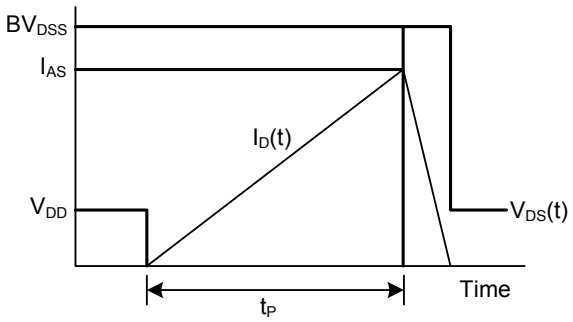


Unclamped Inductive Switching Test Circuit



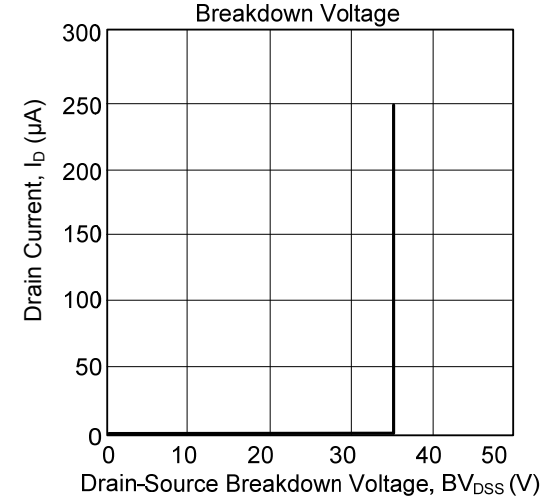
Unclamped Inductive Switching Waveforms

$$E_{AS}=\frac{1}{2}LI_{AS}^{2}\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

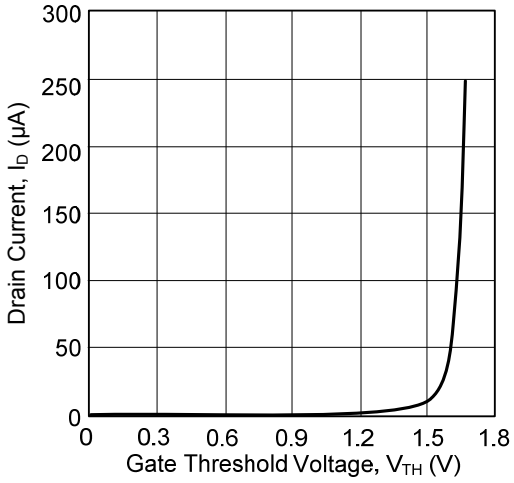


■ TYPICAL CHARACTERISTICS

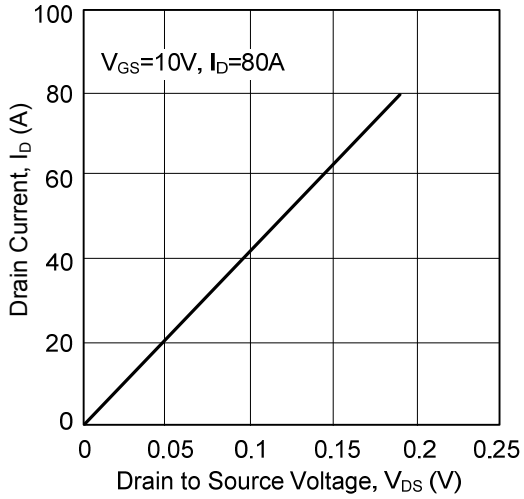
Drain Current vs. Drain-Source Breakdown Voltage



Drain Current vs. Gate Threshold Voltage



Drain-Source On-State Resistance Characteristics



Drain Current vs. Source to Drain Voltage