



## 120A, 30V N-CHANNEL POWER MOSFET

### DESCRIPTION

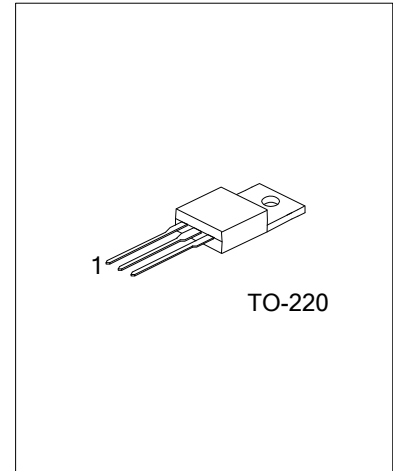
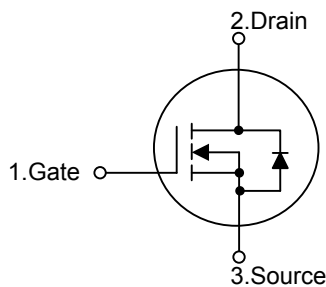
The UTC **UT120N03** is a N-channel power MOSFET using UTC's advanced trench technology to provide customers with a minimum on-state resistance and superior switching performance.

The UTC **UT120N03** is generally applied in DC to DC convertors or synchronous rectifications.

### FEATURES

- \*  $I_D = 120A$
- \*  $V_{DS} = 30V$
- \*  $R_{DS(ON)} = 3.8m\Omega @ V_{GS} = 10V$
- \* Low Gate Charge (Typical 54nC)
- \* Fast Switching
- \* 100% Avalanche Tested
- \* High Power and Current Handling Capability

### SYMBOL



### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UT120N03L-TA3-T	UT120N03G-TA3-T	TO-220	G	D	S	Tube

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

UT120N03L-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 ( $T_C=25^{\circ}\text{C}$ , unless otherwise specified )

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DS}$	30	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	V
Drain Current	Continuous	$I_D$	120	A
	Pulsed (Note 2)	$I_{DM}$	480	A
Single Pulsed Avalanche Energy (Note 3)		$E_{AS}$	240	mJ
Peak Diode Recovery $dv/dt$ (Note 4)		$dv/dt$	6.0	V/ns
Power Dissipation ( $T_C=25^{\circ}\text{C}$ )		$P_D$	125	W
Junction Temperature		$T_J$	+150	$^{\circ}\text{C}$
Storage Temperature		$T_{STG}$	-55~+150	$^{\circ}\text{C}$

- Note: 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.  $L = 0.61\text{mH}$ ,  $I_{AS} = 28\text{A}$ ,  $V_{DD} = 27\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^{\circ}\text{C}$
4.  $I_{SD} \leq 80\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^{\circ}\text{C}$
5. Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 100A.

■ THERMAL CHARACTERISTICS

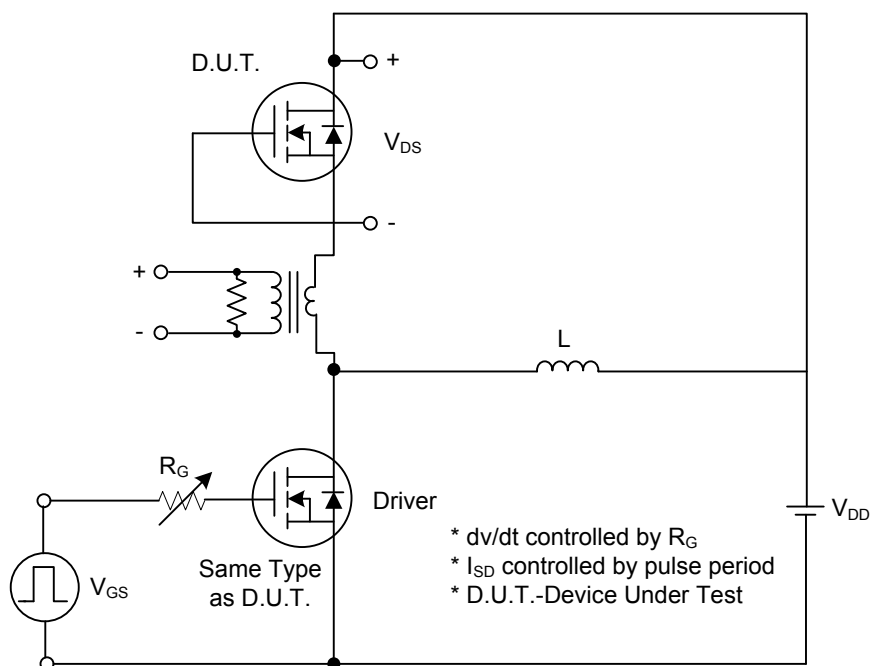
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	62.5	$^{\circ}\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	1	$^{\circ}\text{C}/\text{W}$

■ ELECTRICAL CHARACTERISTICS ( $T_C=25^\circ\text{C}$ , unless otherwise specified)

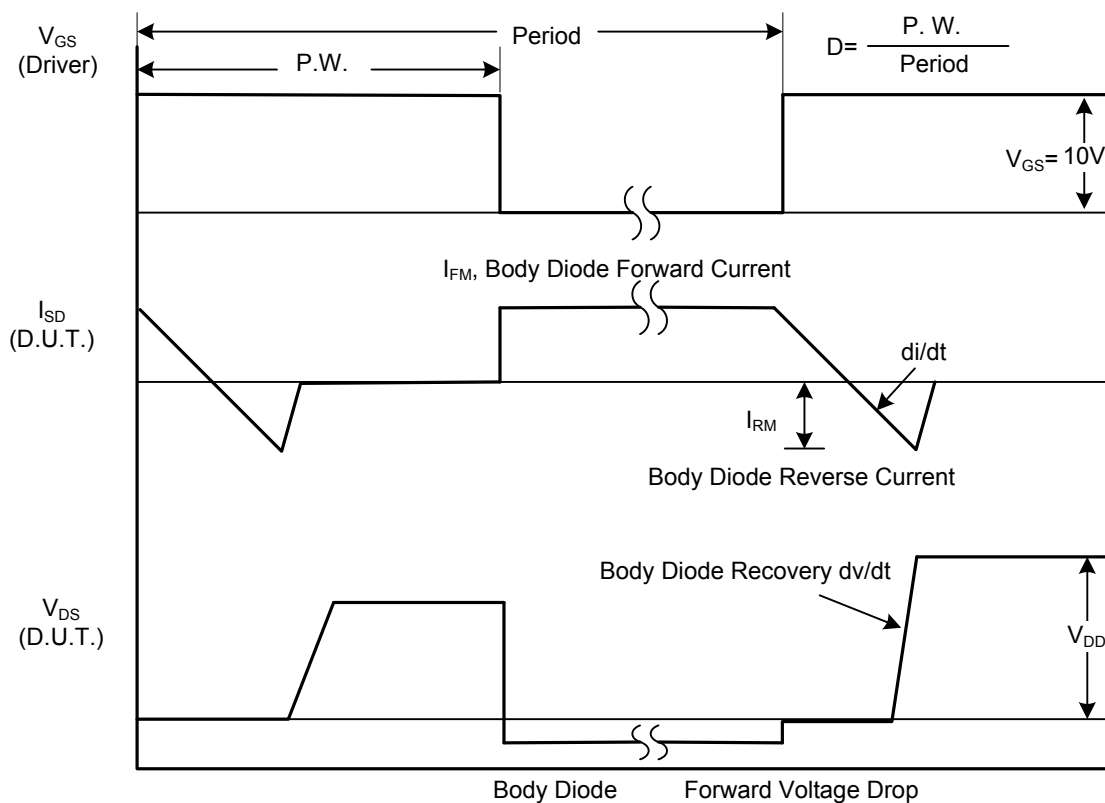
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V, T <sub>C</sub> =25°C	30			V
Breakdown Voltage Temperature Coefficient		ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Reference to 25°C, I <sub>D</sub> =250μA				mV/°C
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V			1	μA
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>	V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V		0.02	100	nA
	Reverse		V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V		-0.02	-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0		3.0	V
Static Drain-Source On-State Resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =35A			3.8	mΩ
			V <sub>GS</sub> =4.5V, I <sub>D</sub> =35A			6.4	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		2990		pF
Output Capacitance		C <sub>OSS</sub>			585		pF
Reverse Transfer Capacitance		C <sub>RSS</sub>			340		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q <sub>G</sub>	V <sub>GS</sub> =5V, V <sub>DS</sub> =15V, I <sub>D</sub> =35A (Note 1, 2)		54	72	nC
Gate to Source Charge		Q <sub>GS</sub>			8.0		nC
Gate to Drain Charge		Q <sub>GD</sub>			10		nC
Turn-ON Delay Time		t <sub>D(ON)</sub>	V <sub>DD</sub> =15V, I <sub>D</sub> =35A, R <sub>G</sub> =4.7Ω, V <sub>GS</sub> =5V (Note 1, 2)		9		ns
Rise Time		t <sub>R</sub>			96		ns
Turn-OFF Delay Time		t <sub>D(OFF)</sub>			47		ns
Fall-Time		t <sub>F</sub>			37		ns
Gate Resistance		R <sub>g</sub>			2.0		Ω
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage		V <sub>SD</sub>	I <sub>S</sub> =120A, V <sub>GS</sub> =0V			1.25	V
Maximum Body-Diode Continuous Current		I <sub>S</sub>				120	A
Maximum Body-Diode Pulsed Current		I <sub>SM</sub>				480	A

Notes: 1. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$   
 2. Essentially independent of operating temperature

# ■ TEST CIRCUITS AND WAVEFORMS

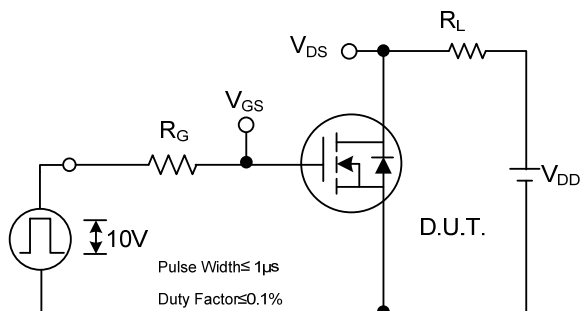


**Peak Diode Recovery  $dv/dt$  Test Circuit**

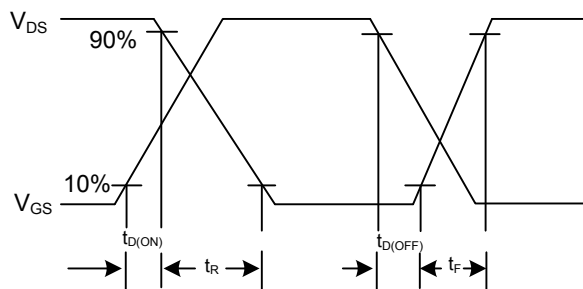


**Peak Diode Recovery  $dv/dt$  Waveforms**

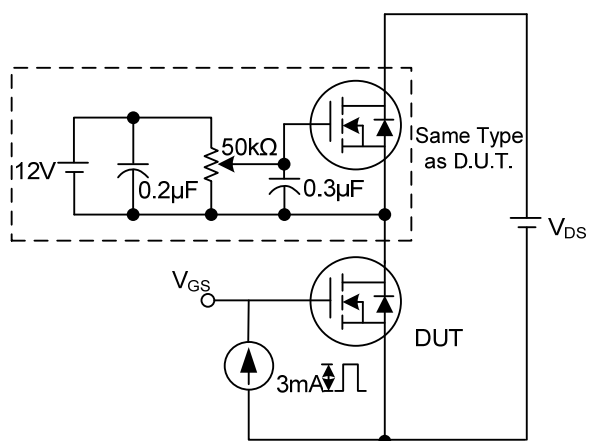
### ■ TEST CIRCUITS AND WAVEFORMS (Cont.)



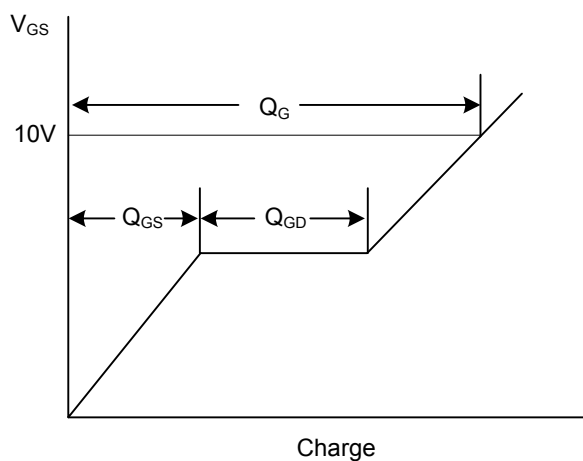
Switching Test Circuit



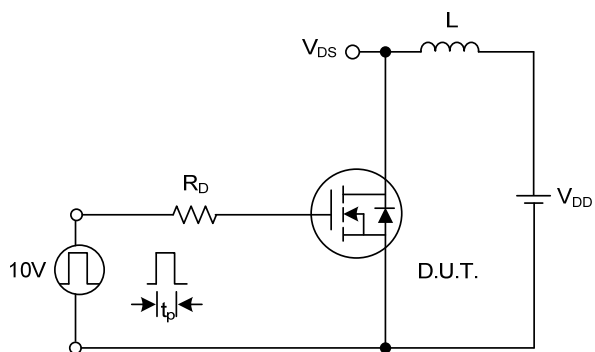
Switching Waveforms



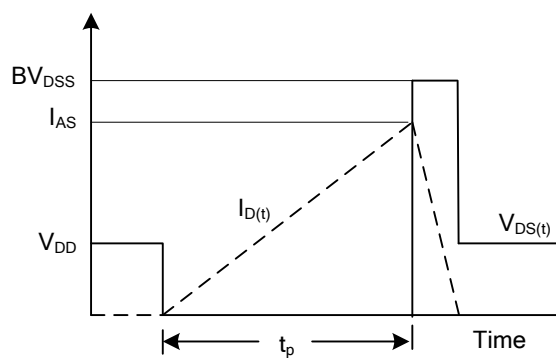
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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