



UT120N03

Preliminary

Power MOSFET

120A, 30V N-CHANNEL POWER MOSFET

DESCRIPTION

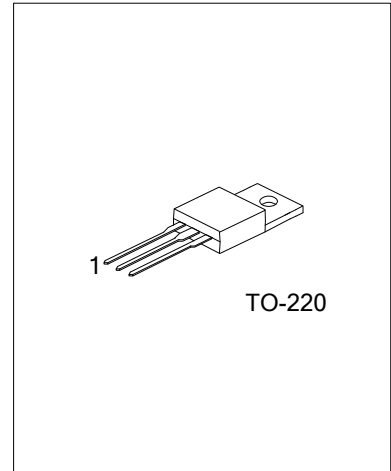
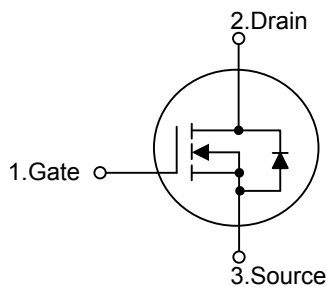
The UTC **UT120N03** is a N-channel power MOSFET using UTC's advanced trench technology to provide customers with a minimum on-state resistance and superior switching performance.

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 (2) Package Type (3) Lead Free	(1) T: Tube (2) TA3: TO-220 (3) G: Halogen Free, L: Lead Free
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■ ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ\text{C}$, 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	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

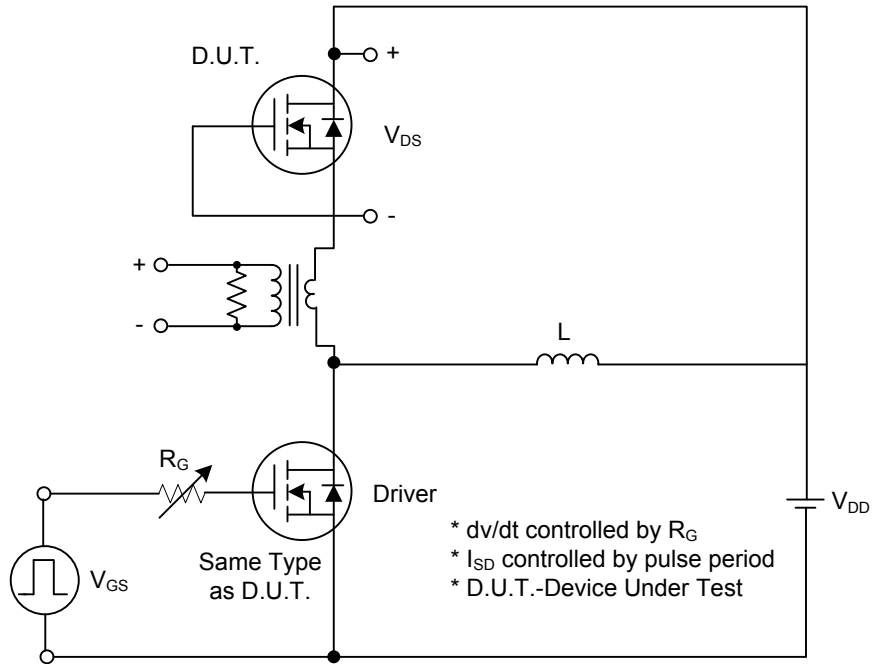
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	1	$^\circ\text{C}/\text{W}$

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

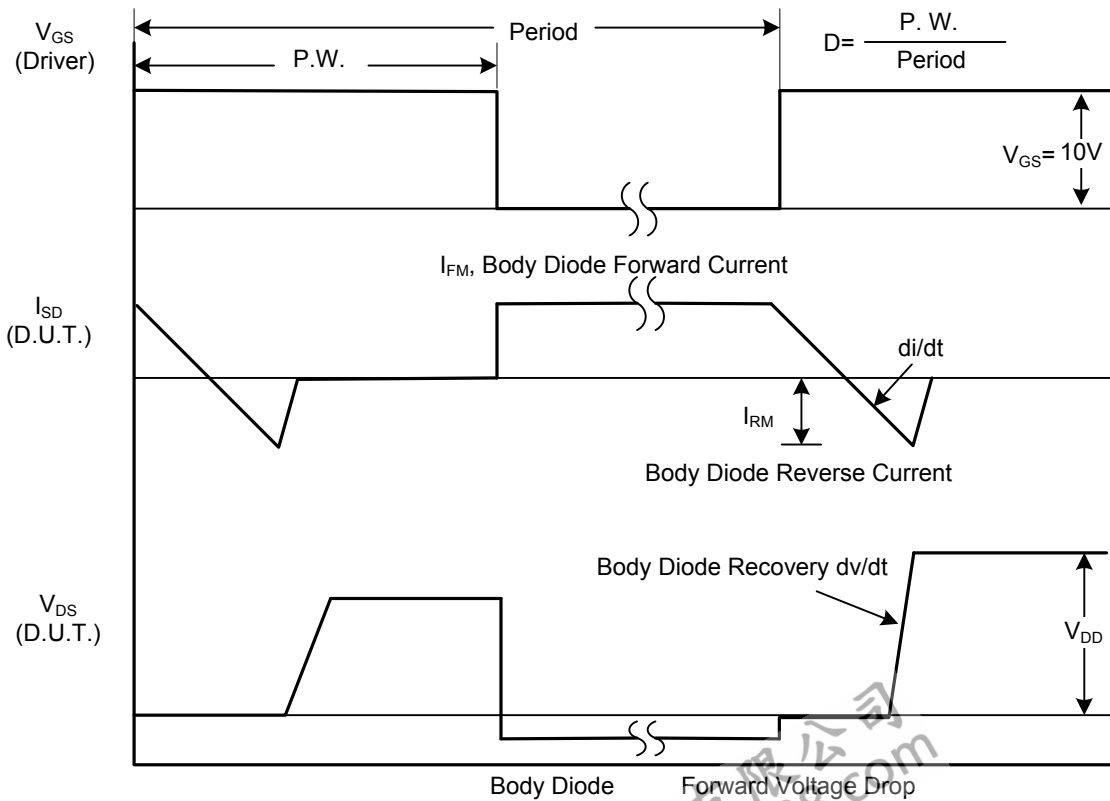
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$, $T_C=25^\circ\text{C}$	30			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to 25°C , $I_D=250\mu\text{A}$				mV/ $^\circ\text{C}$
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=30\text{V}$, $V_{GS}=0\text{V}$			1	μA
Gate- Source Leakage Current	Forward	$V_{GS}=+20\text{V}$, $V_{DS}=0\text{V}$		0.02	100	nA
	Reverse	$V_{GS}=-20\text{V}$, $V_{DS}=0\text{V}$		-0.02	-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1.0		3.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=35\text{A}$			3.8	m Ω
		$V_{GS}=4.5\text{V}$, $I_D=35\text{A}$			6.4	m Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$, $f=1.0\text{MHz}$		2990		pF
Output Capacitance	C_{OSS}			585		pF
Reverse Transfer Capacitance	C_{RSS}			340		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{GS}=5\text{V}$, $V_{DS}=15\text{V}$, $I_D=35\text{A}$ (Note 1, 2)		54	72	nC
Gate to Source Charge	Q_{GS}			8.0		nC
Gate to Drain Charge	Q_{GD}			10		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=15\text{V}$, $I_D=35\text{A}$, $R_G=4.7\Omega$, $V_{GS}=5\text{V}$ (Note 1, 2)		9		ns
Rise Time	t_R			96		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			47		ns
Fall-Time	t_F			37		ns
Gate Resistance	R_g			2.0		Ω
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=120\text{A}$, $V_{GS}=0\text{V}$			1.25	V
Maximum Body-Diode Continuous Current	I_S				120	A
Maximum Body-Diode Pulsed Current	I_{SM}				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

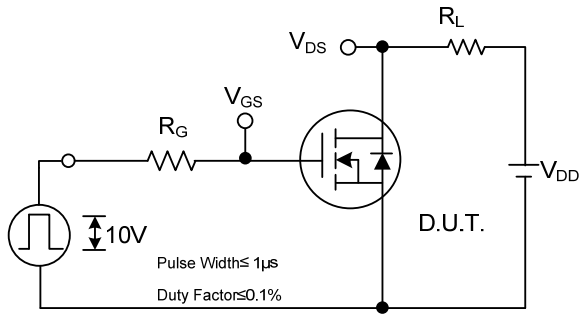


Peak Diode Recovery dv/dt Test Circuit

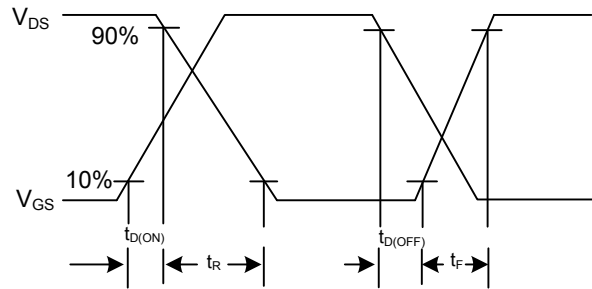


Peak Diode Recovery dv/dt Waveforms

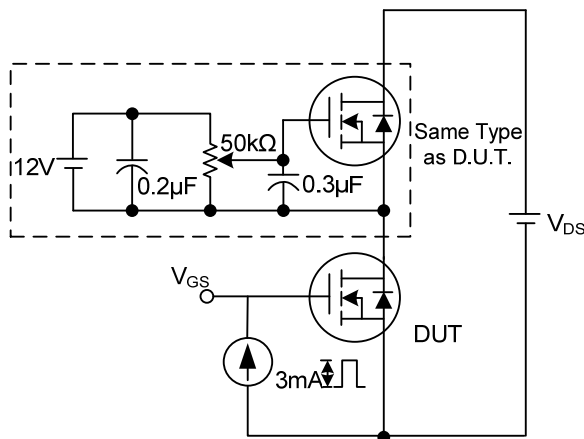
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



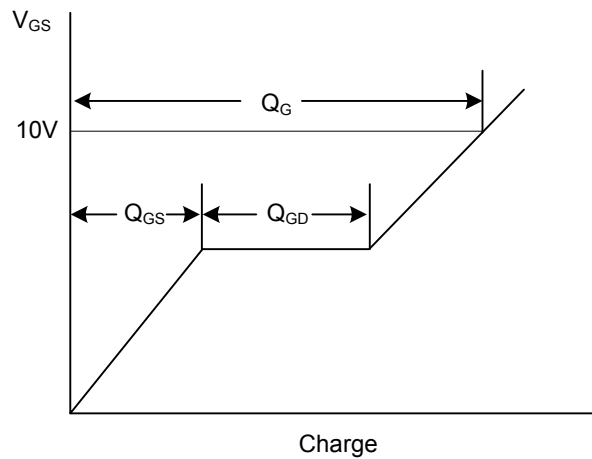
Switching Test Circuit



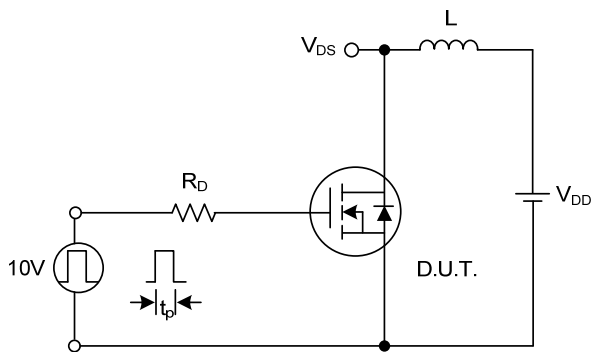
Switching Waveforms



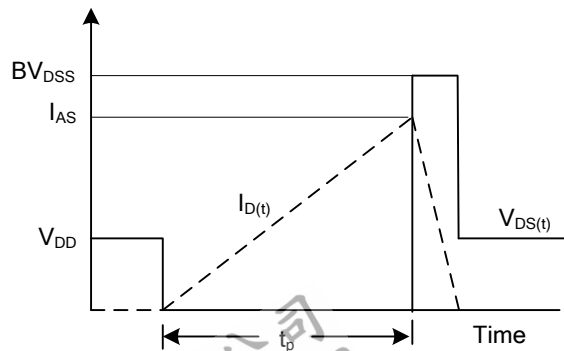
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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