



## 39N20

Preliminary

Power MOSFET

### 39A, 200V N-CHANNEL POWER MOSFET

#### DESCRIPTION

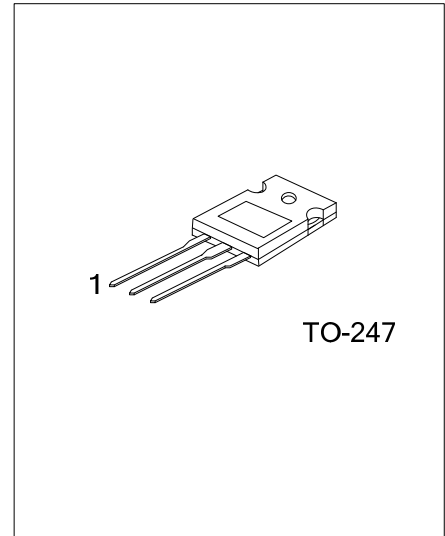
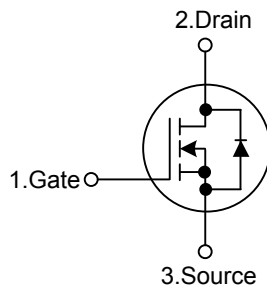
The UTC **39N20** is a N-channel mode power MOSFET using UTC's advanced technology to provide customers with a minimum on-state resistance, low gate charge and high switching speed.

The UTC **39N20** is suitable for high voltage synchronous rectifier and DC/DC converters, etc.

#### FEATURES

- \*  $R_{DS(ON)} < 66m\Omega$  @  $V_{GS}=10V, I_D=19.5A$
- \* Low Gate Charge (Typical 18.5nC)
- \* High Switching Speed

#### SYMBOL



#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
39N20L-T47-T	39N20G-T47-T	TO-247	G	D	S	Tube

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

<p>39N20L-T47-T</p>	<p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Lead Free</p>	<p>(1) T: Tube</p> <p>(2) T47: TO-247</p> <p>(3) G: Halogen Free, L: Lead Free</p>
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■ ABSOLUTE MAXIMUM RATINGS ( $T_C=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	200	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Drain Current	Continuous ( $V_{GS}=10\text{V}$ ) $T_C=25^\circ\text{C}$	$I_D$	39	A
	Pulsed	$I_{DM}$	156	A
Single Pulsed Avalanche Energy (Note 2)		$E_{AS}$	860	mJ
Power Dissipation		$P_D$	310	W
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55~+150	$^\circ\text{C}$

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. Starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.85\text{mH}$ ,  $I_{AS} = 39\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ .

3. Pulse Width = 100 $\mu\text{s}$

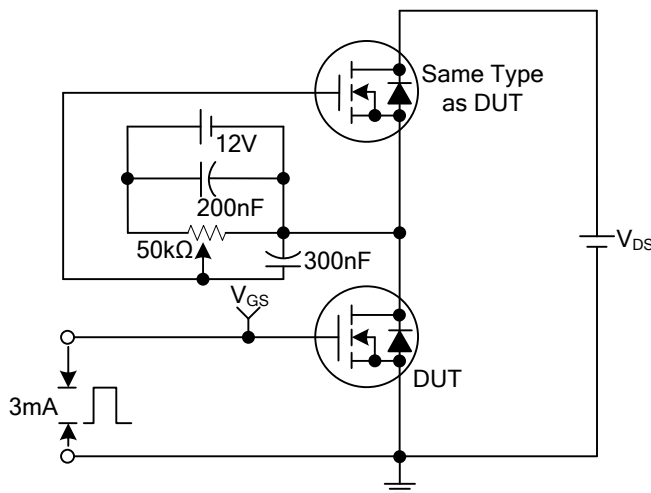
■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	40	$^\circ\text{C/W}$
Junction to Case	$\theta_{JC}$	0.37	$^\circ\text{C/W}$

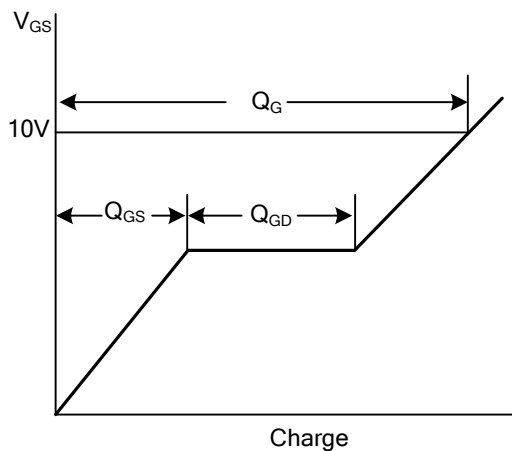
■ ELECTRICAL CHARACTERISTICS ( $T_C=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	200			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=200\text{V}$ , $V_{GS}=0\text{V}$			1	$\mu\text{A}$
Gate- Source Leakage Current	Forward	$I_{GSS}$ $V_{GS}=+20\text{V}$ , $V_{DS}=0\text{V}$ $V_{GS}=-20\text{V}$ , $V_{DS}=0\text{V}$			+100	nA
	Reverse				-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	2		4	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=19.5\text{A}$		56	66	m $\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0\text{V}$ , $V_{DS}=25\text{V}$ , $f=1.0\text{MHz}$		1250		pF
Output Capacitance	$C_{OSS}$			190		pF
Reverse Transfer Capacitance	$C_{RSS}$			45		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge at 10V	$Q_G$	$V_{GS}=10\text{V}$ , $V_{DD}=50\text{V}$ , $I_D=39\text{A}$		18.5	28	nC
Gate to Source Charge	$Q_{GS}$			6.5		nC
Gate to Drain Charge	$Q_{GD}$			4.6		nC
Turn-ON Time	$t_{ON}$	$V_{DD}=50\text{V}$ , $I_D=39\text{A}$ , $V_{GS}=10\text{V}$ , $R_G=16\Omega$		30	70	ns
Turn-ON Delay Time	$t_{D(ON)}$			160		ns
Rise Time	$t_R$			150		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			150		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_{SD}=39\text{A}$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				39	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				156	A

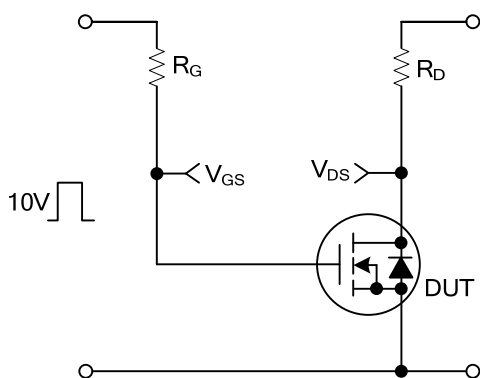
■ TEST CIRCUITS AND WAVEFORMS



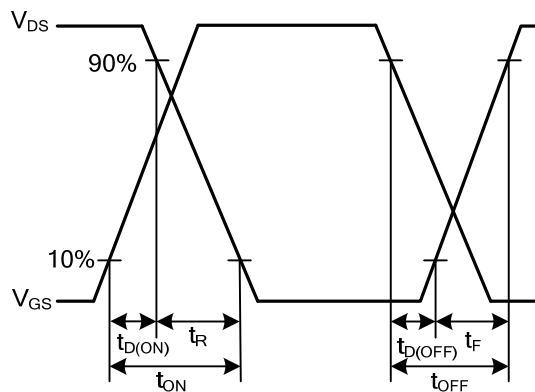
Gate Charge Test Circuit



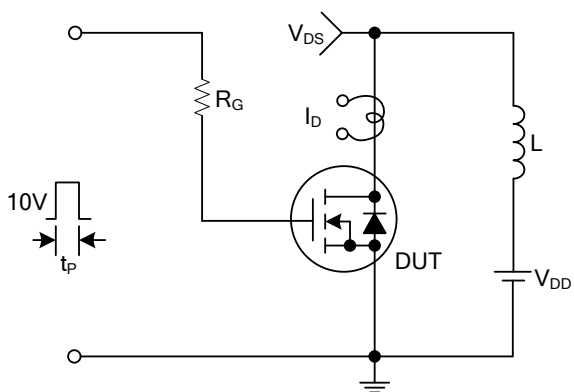
Gate Charge Waveforms



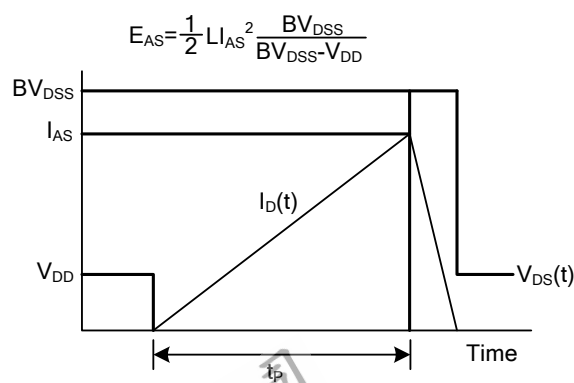
Resistive Switching Test Circuit



Resistive Switching Waveforms

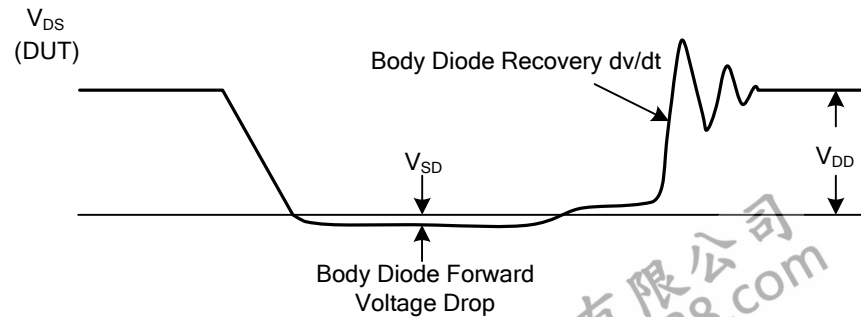
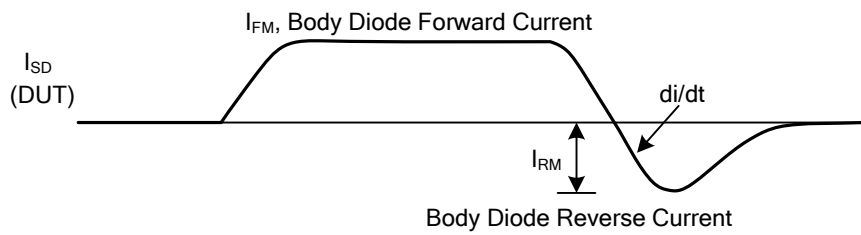
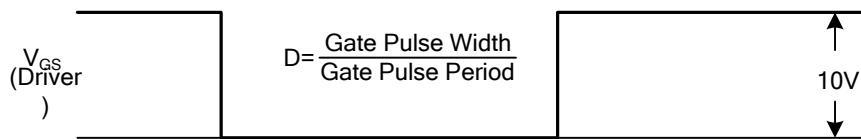
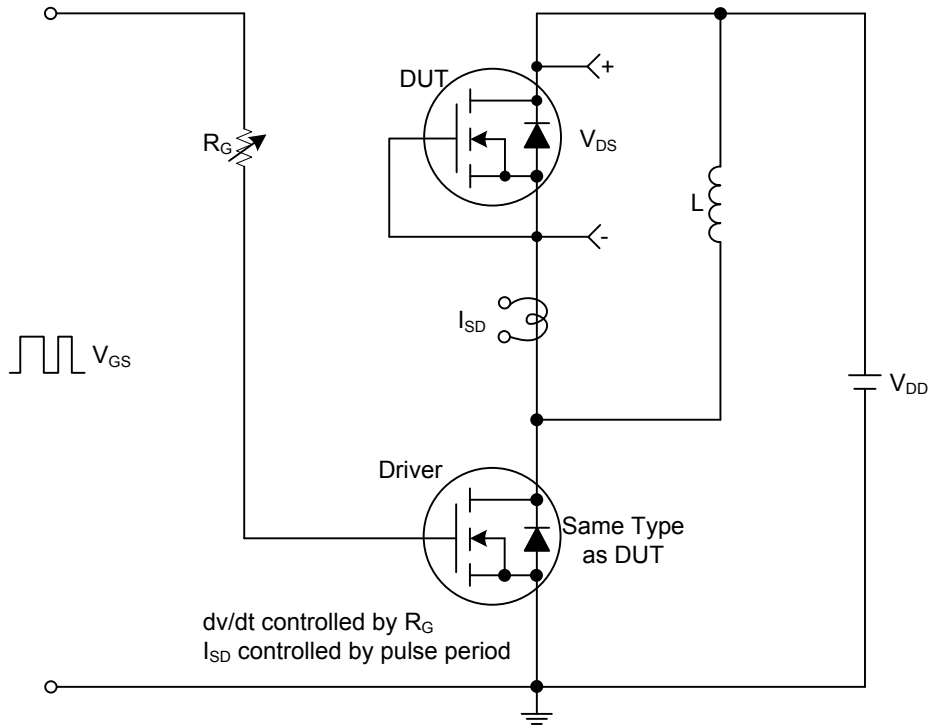


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS(Cont.)



Peak Diode Recovery  $dv/dt$  Test Circuit and Waveforms

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