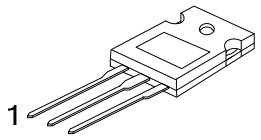
39A, 200V N-CHANNEL POWER MOSFET



TO-247

■ DESCRIPTION

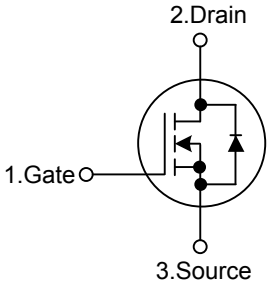
The UTC **39N20** is a N-channel mode power MOSFET using UTC's advanced technology to provide customers with a minimum on-state resistance, low gate charge and high switching speed.

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

■ FEATURES

* $R_{DS(ON)}$<66mΩ @ 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

39N20L-T47-T

(1)Packing Type	(1) T: Tube
(2)Package Type	(2) T47: TO-247
(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}	200	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous (V_{GS}=10V) T_C=25°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	°C
Storage Temperature		T_{STG}	-55~+150	°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°C, L = 0.85mH, I_{AS} = 39A, V_{DD}=50V, R_G=25Ω.
3. Pulse Width = 100μs

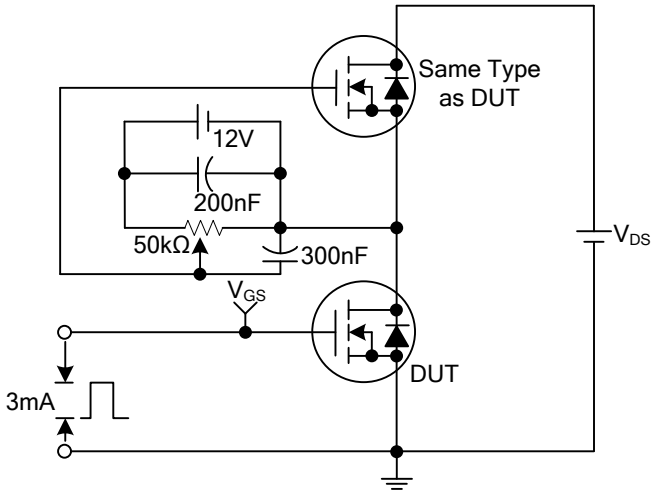
■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	40	°C/W
Junction to Case	θ_{JC}	0.37	°C/W

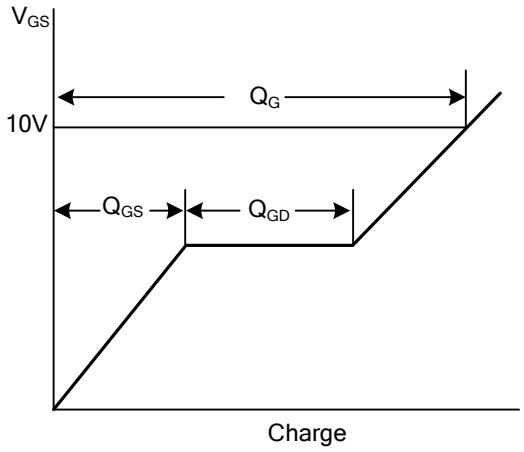
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	200			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=200V, 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	2		4	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=19.5A		56	66	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		1250		pF
Output Capacitance		C_{OSS}			190		pF
Reverse Transfer Capacitance		C_{RSS}			45		pF
SWITCHING PARAMETERS							
Total Gate Charge at 10V		Q_G	V_{GS}=10V,V_{DD}=50V,I_D=39A		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}=50V, I_D=39A, V_{GS}=10V, R_G=16Ω		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
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage		V_{SD}	I_{SD}=39A			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

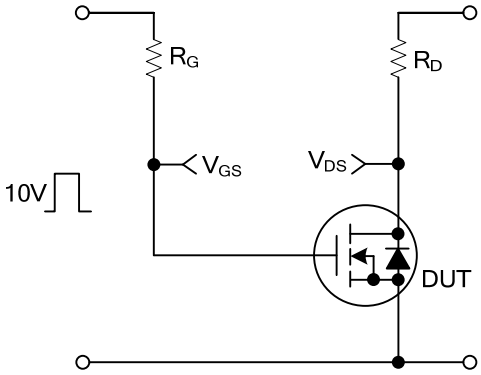
■ TEST CIRCUITS AND WAVEFORMS



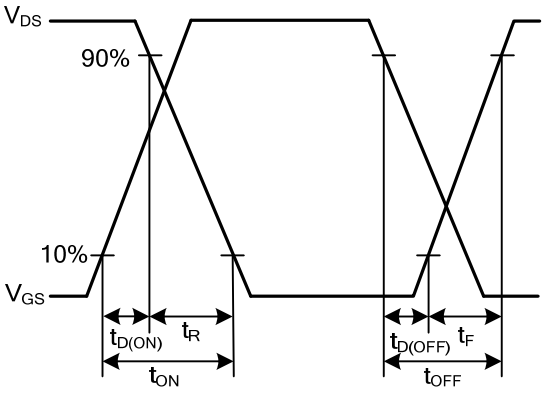
Gate Charge Test Circuit



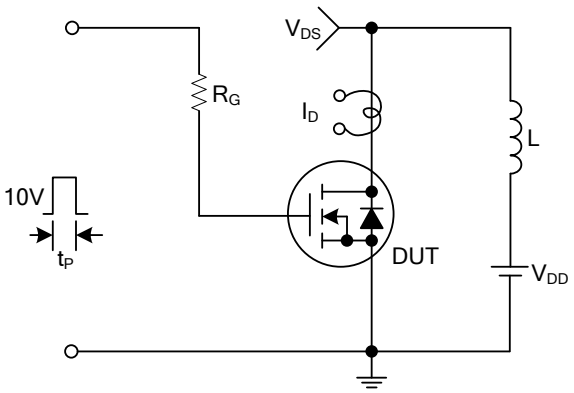
Gate Charge Waveforms



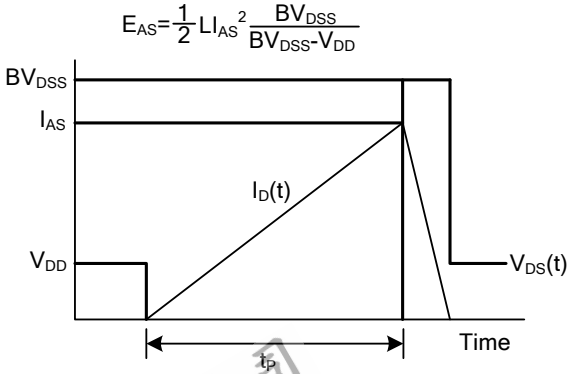
Resistive Switching Test Circuit



Resistive Switching Waveforms

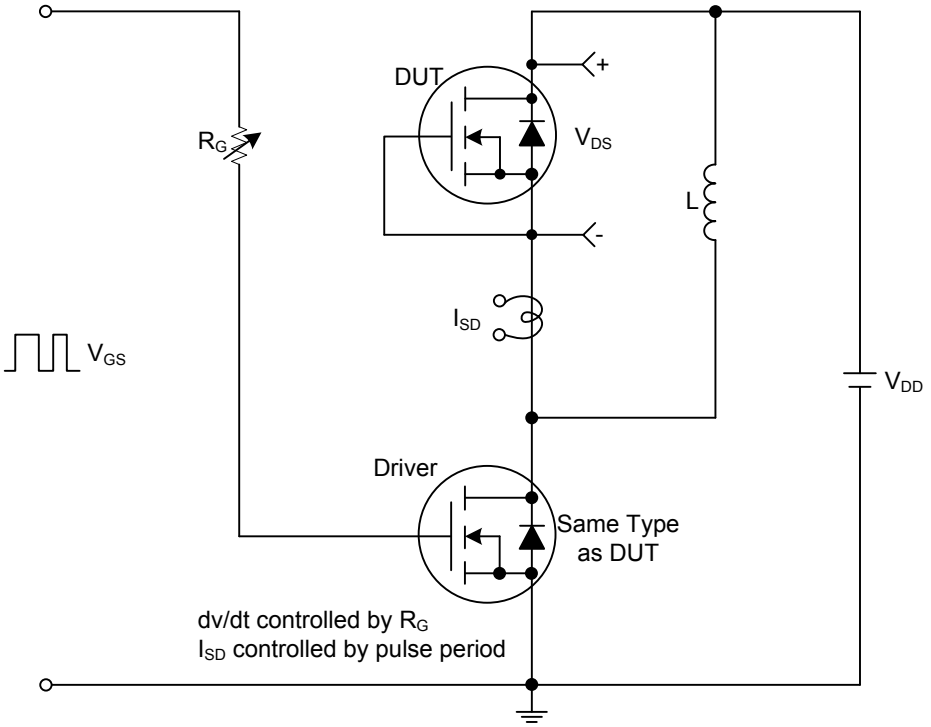


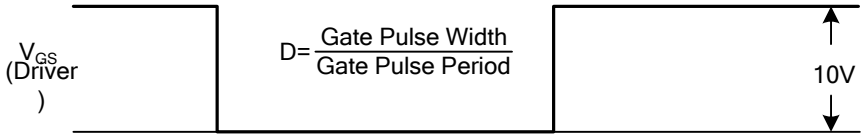
Unclamped Inductive Switching Test Circuit

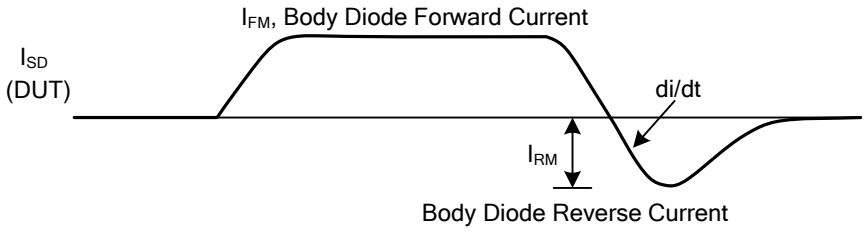


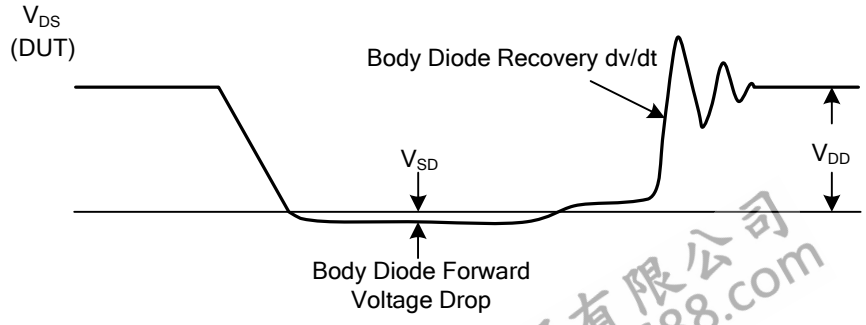
Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS(Cont.)









Peak Diode Recovery dv/dt Test Circuit and Waveforms