



20N15

Power MOSFET

20A, 150V N-CHANNEL POWER MOSFET

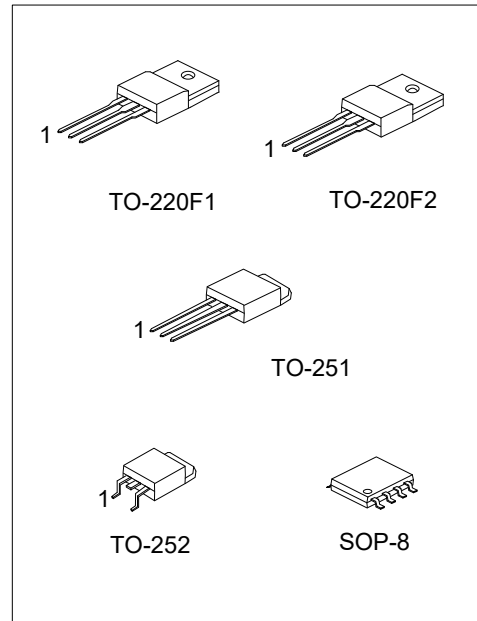
■ DESCRIPTION

The UTC **20N15** is an N-Channel POWER MOSFET, it uses UTC's advanced technology to provide customers with high switching speed and low gate charge.

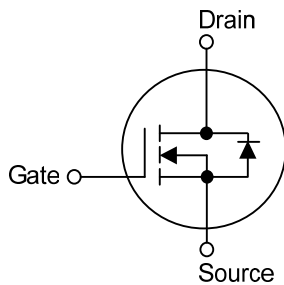
The UTC **20N15** is suitable for bridge circuits, power converters and PWM motor controls.

■ FEATURES

- * $R_{DS(on)} \leq 0.13 \Omega @ V_{GS}=10V, I_D=10A$
- $R_{DS(on)} \leq 2.8 \Omega @ V_{GS}=10V, I_D=20A$
- * High switching speed
- * Low gate charge



■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
20N15L-TF1-T	20N15G-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
20N15L-TF2-T	20N15G-TF2-T	TO-220F2	G	D	S	-	-	-	-	-	Tube
20N15L-TM3-T	20N15G-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
20N15L-TN3-R	20N15G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
20N15L-S08-R	20N15G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

<p>20N15G-TF1-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TF1: TO-220F1, TF2: TO-220F2, TM3: TO-251</p> <p>TN3: TO-252, S08: SOP-8</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING

TO-220F1 / TO-220F2 / TO-251 / TO-252	SOP-8

■ ABSOLUTE MAXIMUM RATINGS ($T_c=25^\circ\text{C}$, unless otherwise noted)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	150	V
Gate-Source Voltage	Continuous	V_{GSS}	± 20	V
Drain Current	Continuous	I_D	20	A
	Single Pulsed ($t_p \leq 10\mu\text{s}$)	I_{DM}	60	A
Single Drain-to-Source Avalanche Energy	Starting $T_J=25^\circ\text{C}$ ($V_{DD}=120\text{V}$, $V_{GS}=10\text{V}$, $I_L=20\text{A}$, $L=0.3\text{mH}$)	E_{AS}	60	mJ
Power Dissipation	TO-220F1/ TO-220F2	P_D	36	W
	TO-251/TO-252		50	W
	SOP-8		8	W
Operating Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature Range		T_{STG}	-55 ~ +150	$^\circ\text{C}$

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 DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F1/TO-220F2	θ_{JA}	62.5	$^\circ\text{C/W}$
	TO-251/TO-252		110	$^\circ\text{C/W}$
	SOP-8		90	$^\circ\text{C/W}$
Junction to Case	TO-220F1/ TO-220F2	θ_{JC}	3.47	$^\circ\text{C/W}$
	TO-251/TO-252		2.5	$^\circ\text{C/W}$
	SOP-8		15.6	$^\circ\text{C/W}$

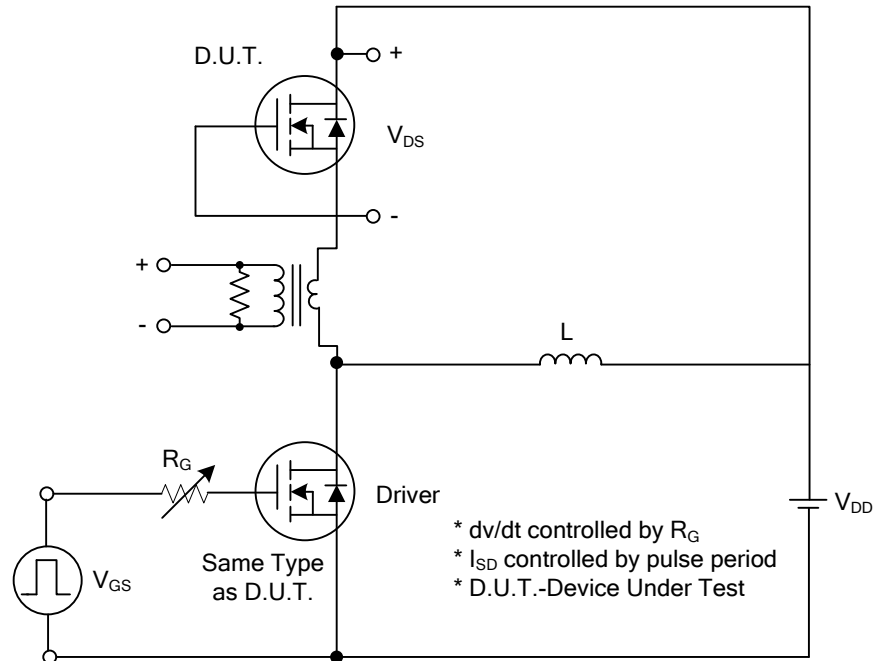
■ ELECTRICAL CHARACTERISTICS ($T_J=25^\circ\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=0.25\text{mA}$, $V_{GS}=0\text{V}$	150			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=150\text{V}$, $V_{GS}=0\text{V}$			10	μA
		$V_{DS}=150\text{V}$, $V_{GS}=0\text{V}$, $T_J=125^\circ\text{C}$			100	μA
Gate-Source Leakage Current	Forward	I_{GSS}			100	nA
	Reverse					
					100	nA
		$V_{GS}=-20\text{V}$, $V_{DS}=0\text{V}$				
ON CHARACTERISTICS (Note 1)						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=0.25\text{mA}$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=10\text{A}$		0.12	0.13	Ω
Drain-Source On-Voltage	$V_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=20\text{A}$			2.8	V
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$, $f=1.0\text{MHz}$		1133	1627	pF
Output Capacitance	C_{OSS}			332	474	pF
Reverse Transfer Capacitance	C_{RSS}			105	174	pF
SWITCHING PARAMETERS (Note 2)						
Gate Charge	Q_G	$V_{GS}=10\text{V}$, $V_{DS}=75\text{V}$, $I_D=20\text{A}$		39.1	55.9	nC
	Q_{GS}			7.5		nC
	Q_{GD}			22		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=75\text{V}$, $V_{GS}=10\text{V}$, $I_D=20\text{A}$, $R_G=9.1\Omega$		11	25	ns
Rise Time	t_R			77	153	ns
Turn-OFF Delay Time	$t_{D(OFF)}$			33	67	ns
Fall-Time	t_F			49	97	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_S=20\text{A}$, $V_{GS}=0\text{V}$			1.5	V
Maximum Continuous Drain-Source Diode Forward Current	I_S				20	A
Pulsed Drain-Source Current	I_{SM}				60	A
Body Diode Reverse Recovery Time	t_{RR}	$I_S=20\text{A}$, $V_{GS}=0\text{V}$, $dI_S/dt=100\text{A}/\mu\text{s}$		160		ns
Body Diode Reverse Recovery Charge	Q_{RR}			1.1		μC

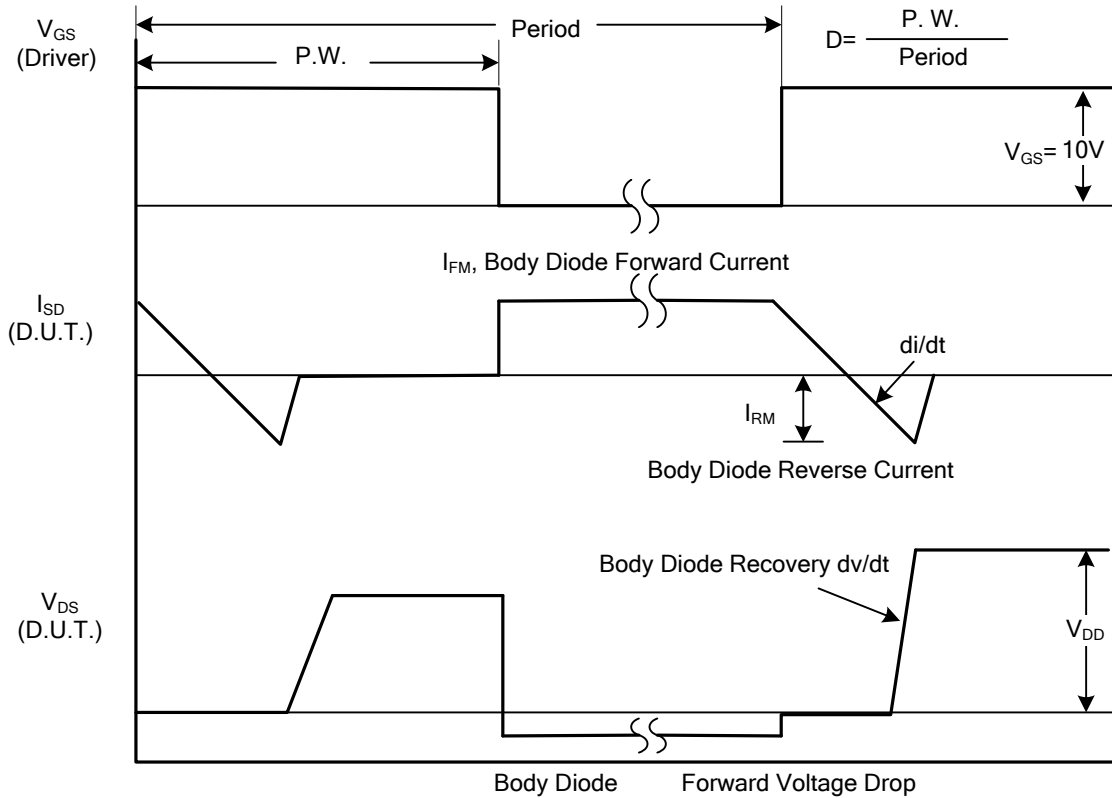
Notes: 1. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

2. Switching characteristics are independent of operating junction temperature.

■ TEST CIRCUITS AND WAVEFORMS

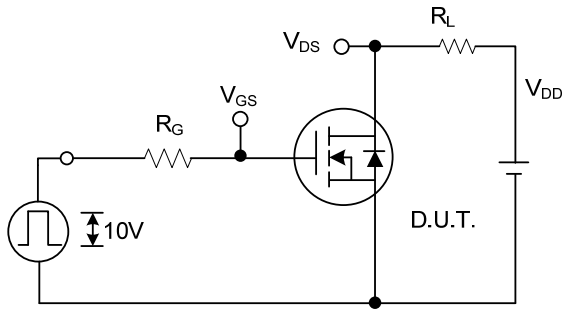


Peak Diode Recovery dv/dt Test Circuit

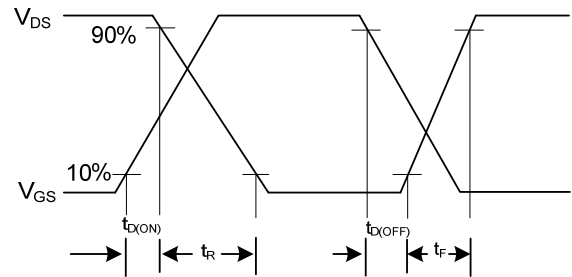


Peak Diode Recovery dv/dt Waveforms

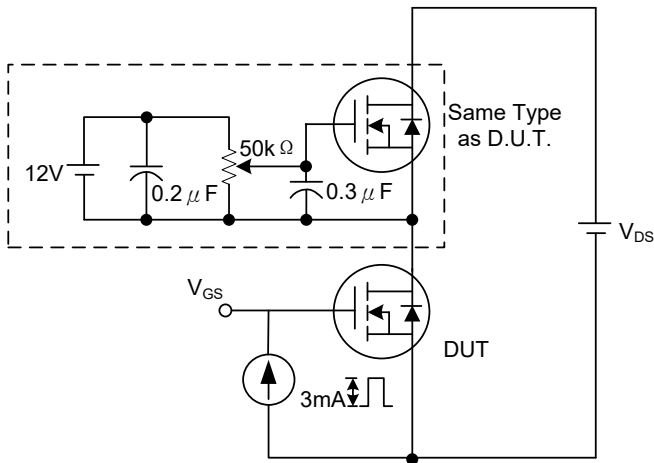
TEST CIRCUITS AND WAVEFORMS



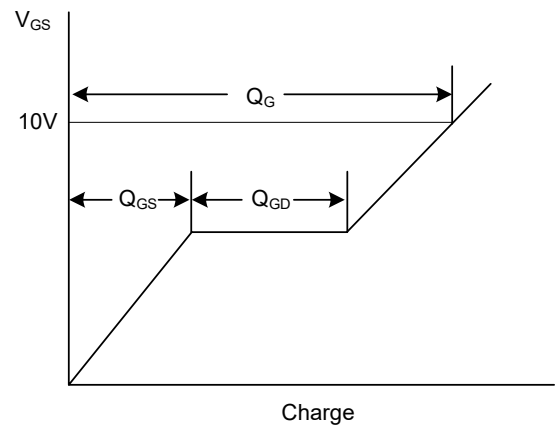
Switching Test Circuit



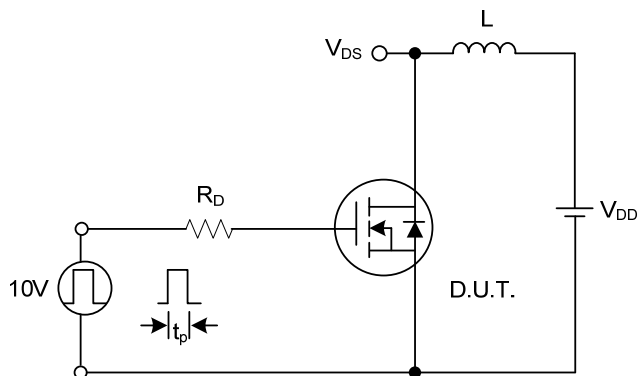
Switching Waveforms



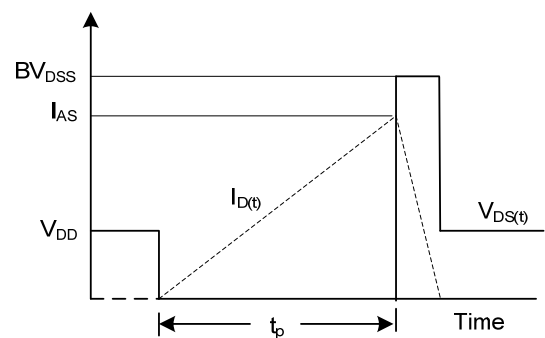
Gate Charge Test Circuit



Gate Charge Waveform

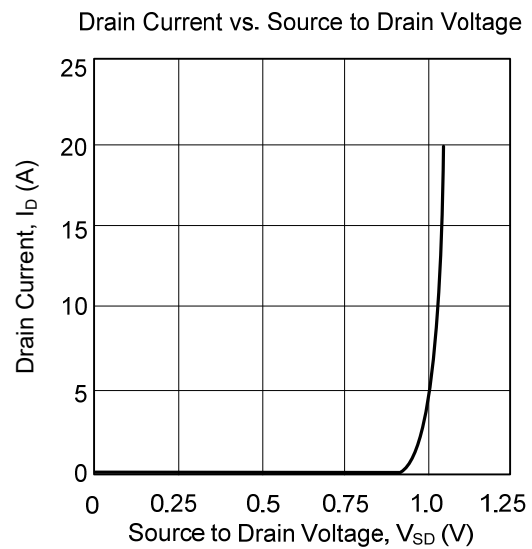
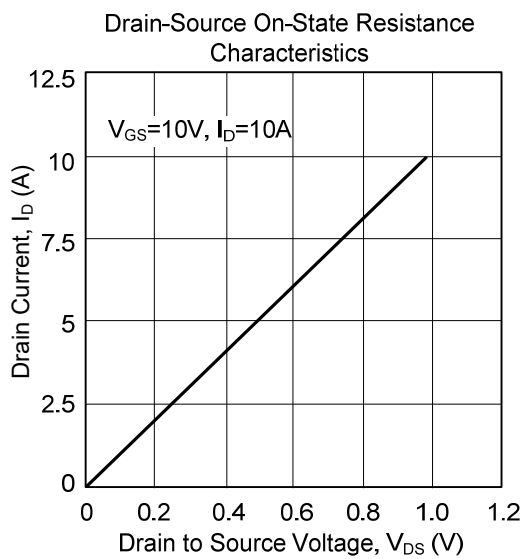
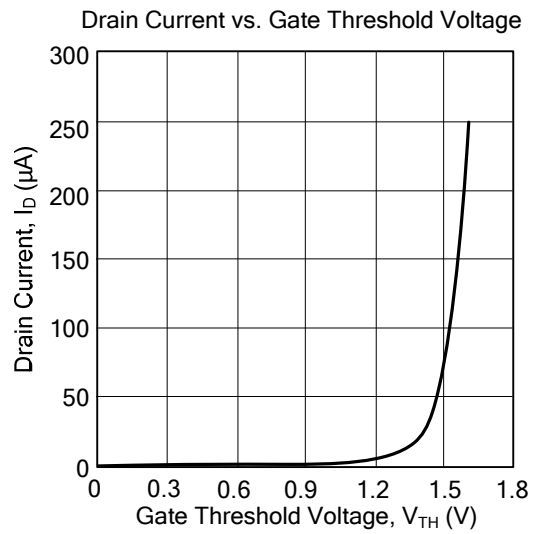
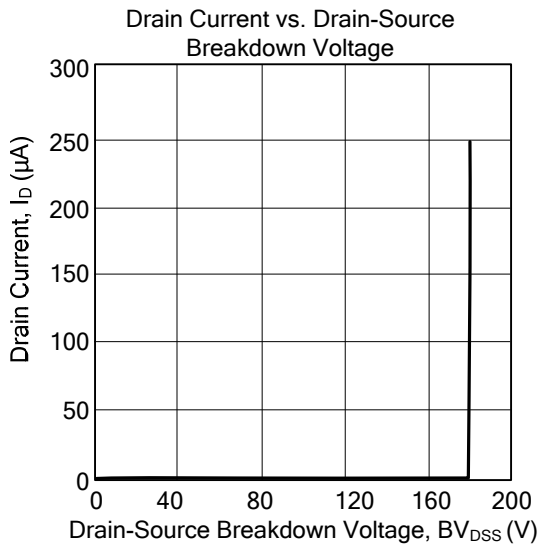


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



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