



# 20N15

**Power MOSFET**

## 20A, 150V N-CHANNEL POWER MOSFET

■ DESCRIPTION

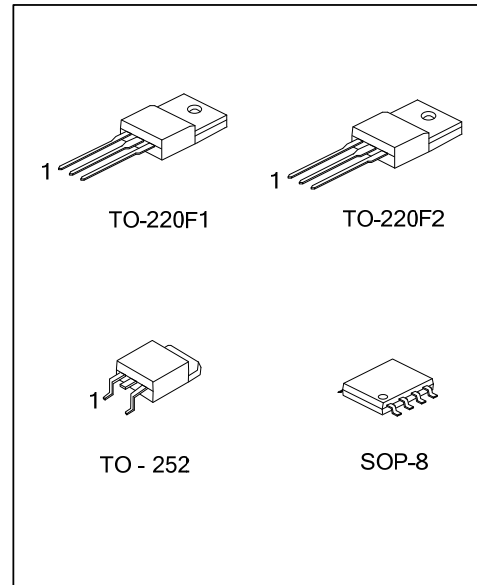
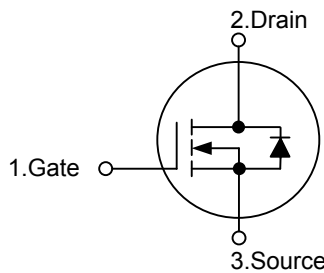
The UTC **20N15** is an N-Channel POWER MOSFET, it uses UTC's advanced technology to provide customers with high switching speed and low gate charge.

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

■ FEATURES

- \*  $R_{DS(on)} < 0.13\Omega @ V_{GS}=10V, I_D=10A$
- \* 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-TN3-R	20N15G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
-	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>20N15L-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, TN3: TO-252, S08: SOP-8</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
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■ MARKING

TO-220F1 / TO-220F2 / 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	$V_{GSS}$	$\pm 20$	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		$E_{AS}$	60	mJ
Power Dissipation	TO-220F1	$P_D$	36	W
	TO-220F2		38	W
	TO-252		50	W
	SOP-8		10	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 CHARACTERISTICS

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F1/TO-220F2	$\theta_{JA}$	62.5	$^\circ\text{C/W}$
	TO-252		110	$^\circ\text{C/W}$
	SOP-8		85	$^\circ\text{C/W}$
Junction to Case	TO-220F1	$\theta_{JC}$	3.47	$^\circ\text{C/W}$
	TO-220F2		3.28	$^\circ\text{C/W}$
	TO-252		2.5	$^\circ\text{C/W}$
	SOP-8		12.5	$^\circ\text{C/W}$

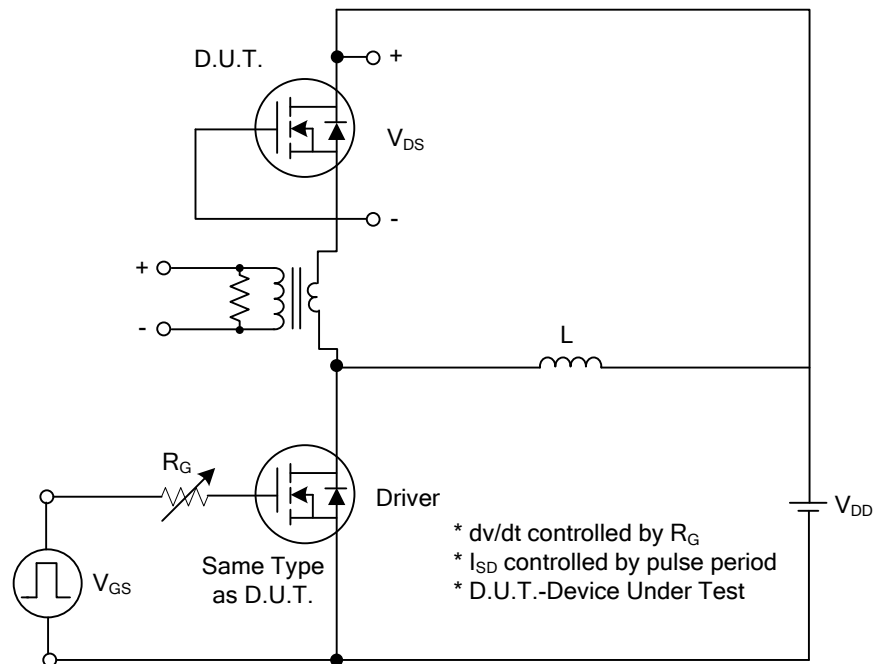
■ ELECTRICAL CHARACTERISTICS ( $T_J=25^\circ\text{C}$ , unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
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	$\mu\text{A}$
		$V_{DS}=150\text{V}$ , $V_{GS}=0\text{V}$ , $T_J=125^\circ\text{C}$			100	$\mu\text{A}$
Gate-Source Leakage Current	Forward	$I_{GSS}$			100	nA
	Reverse					
<b>ON CHARACTERISTICS (Note 1)</b>						
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	$\Omega$
Drain-Source On-Voltage	$V_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=20\text{A}$			2.8	V
<b>DYNAMIC PARAMETERS</b>						
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
<b>SWITCHING PARAMETERS (Note 2)</b>						
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
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
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		$\mu\text{C}$

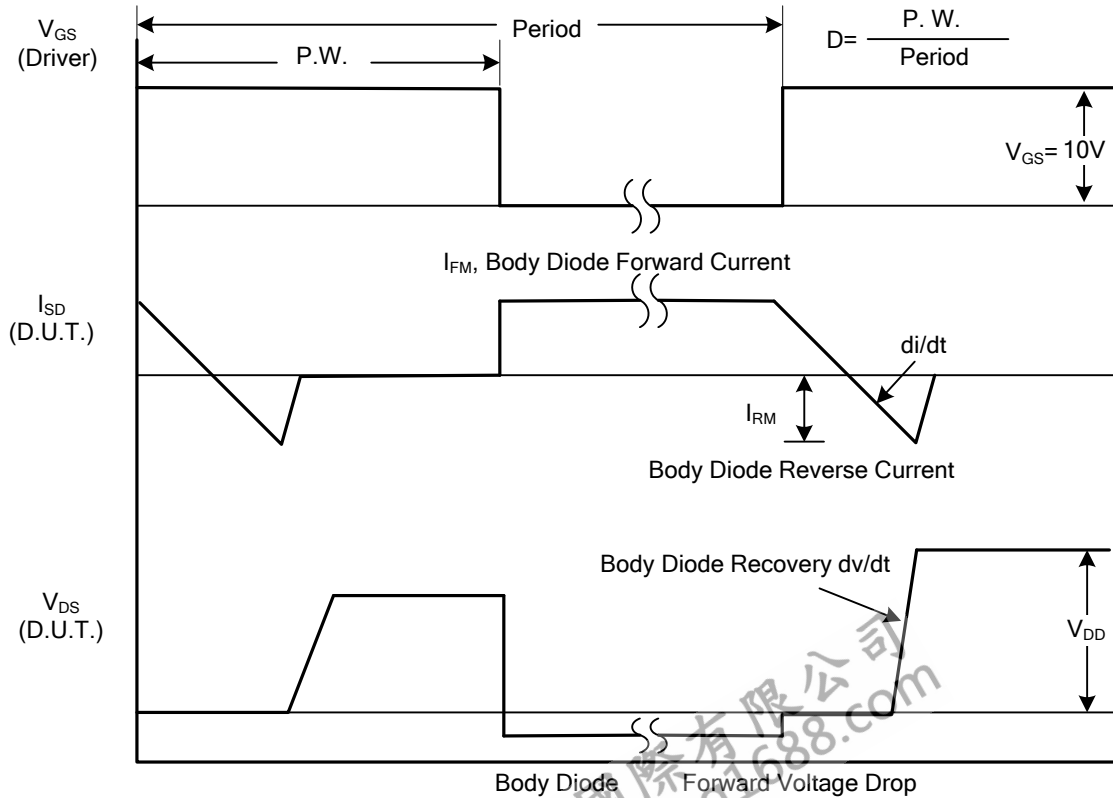
Notes: 1. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

2. Switching characteristics are independent of operating junction temperature.

■ TEST CIRCUITS AND WAVEFORMS

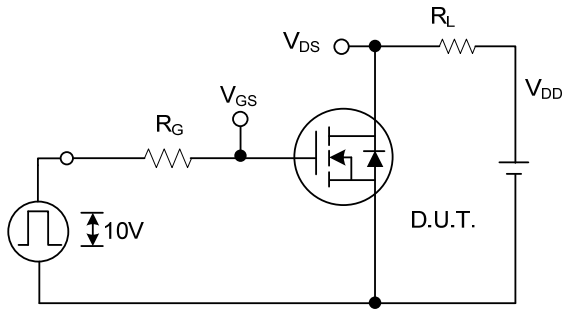


Peak Diode Recovery dv/dt Test Circuit

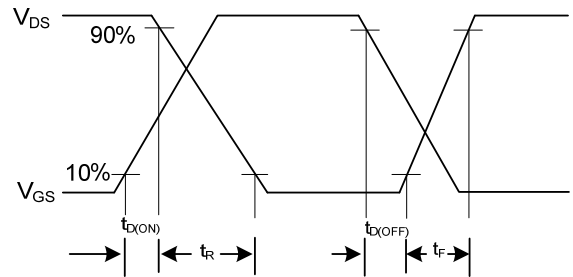


Peak Diode Recovery dv/dt Waveforms

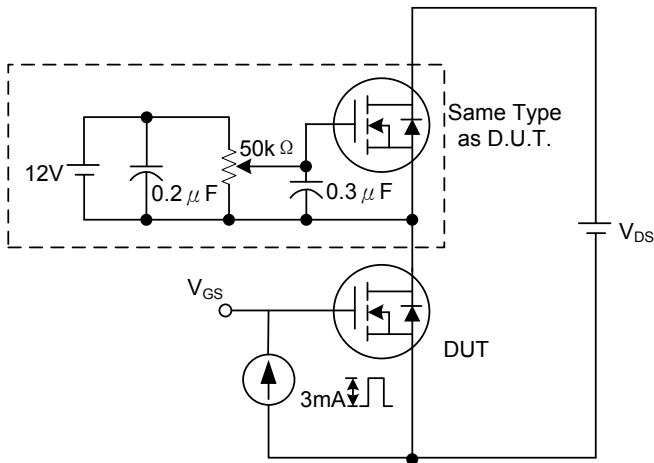
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



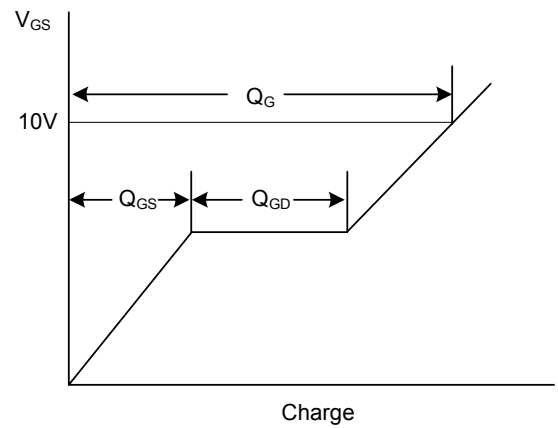
Switching Test Circuit



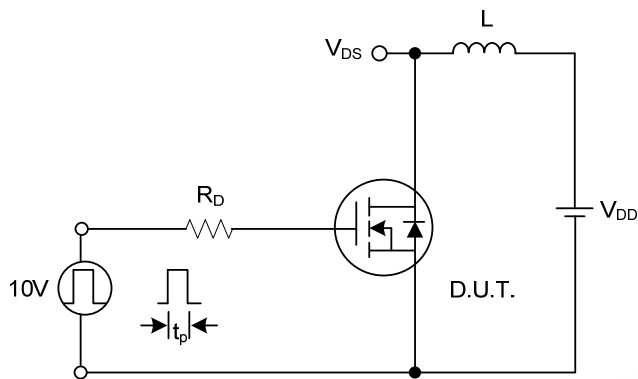
Switching Waveforms



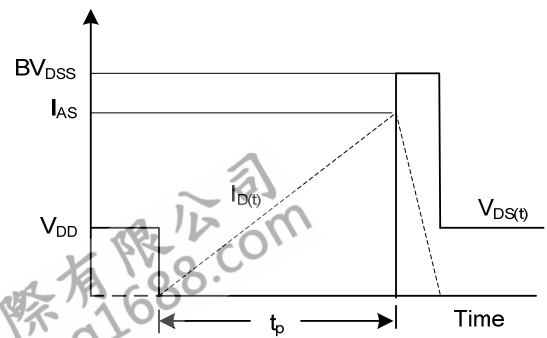
Gate Charge Test Circuit



Gate Charge Waveform

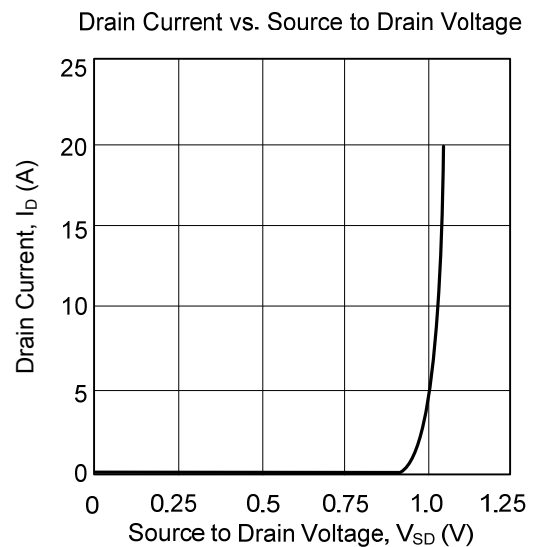
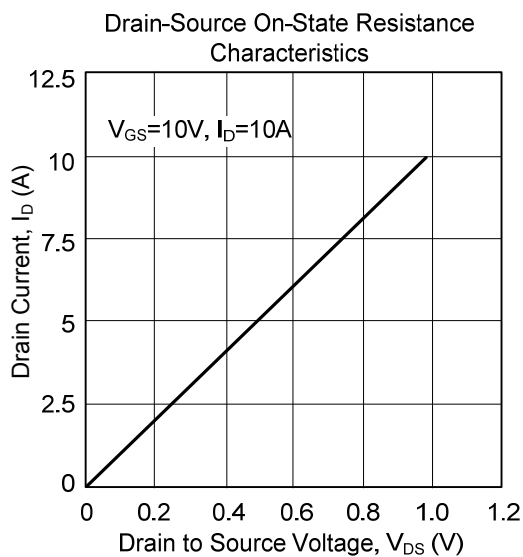
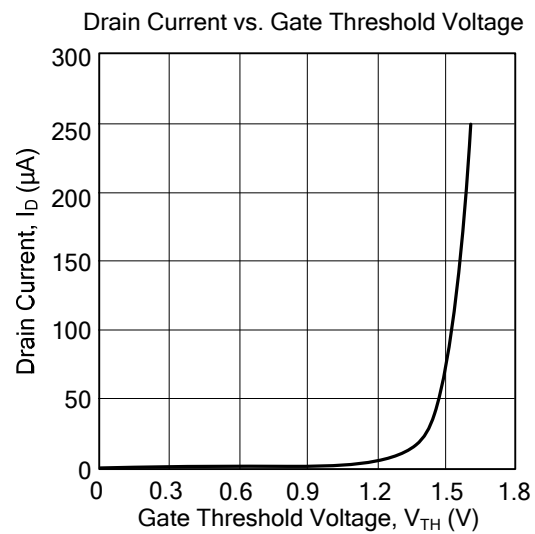
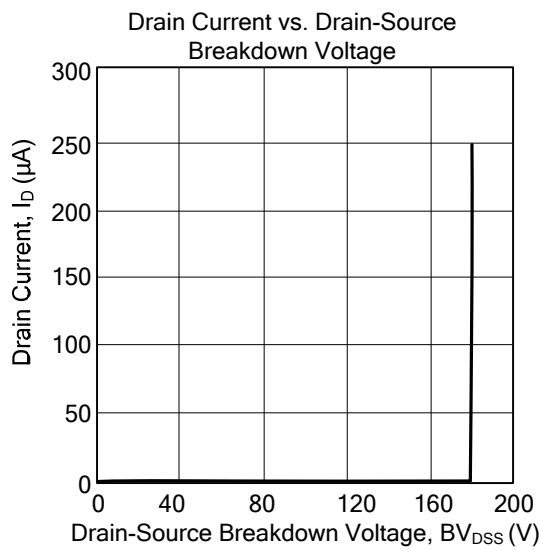


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

## TYPICAL CHARACTERISTICS



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