



# 20N15V

**Power MOSFET**

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

■ DESCRIPTION

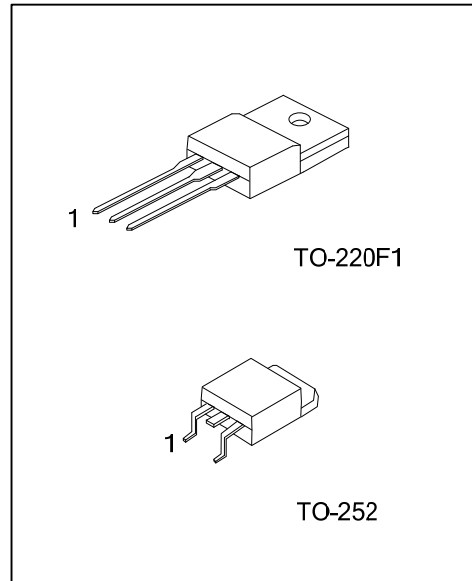
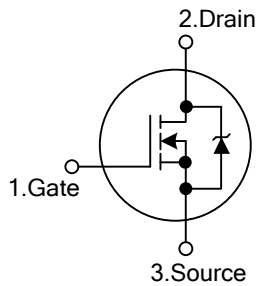
The UTC **20N15V** is a N-Channel POWER MOSFET, it uses UTC's advanced technology to provide customers with high switching speed and low gate charge.

The UTC **20N15V** 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	
20N15VL-TF1-T	20N15VG-TF1-T	TO-220F1	G	D	S	Tube
20N15VL-TN3-R	20N15VG-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>20N15VG-TF1-T</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TF1: TO-220F1, TN3: TO-252</p> <p>(3) G: Halogen Free and Lead 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		$V_{DSS}$	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	Starting $T_J=25^\circ\text{C}$	$E_{AS}$	60	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	30	V/ns
Power Dissipation	TO-220F1	$P_D$	36	W
	TO-252		50	W
Operating Temperature		$T_J$	+150	$^\circ\text{C}$
Storage Temperature Range		$T_{STG}$	-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. Repetitive Rating: Pulse width limited by maximum junction temperature.

3.  $L=0.3\text{ mH}$ ,  $I_{AS}=20\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\ \Omega$ , Starting  $T_J=25^\circ\text{C}$

4.  $I_{SD} \leq 30\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$

■ THERMAL DATA

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

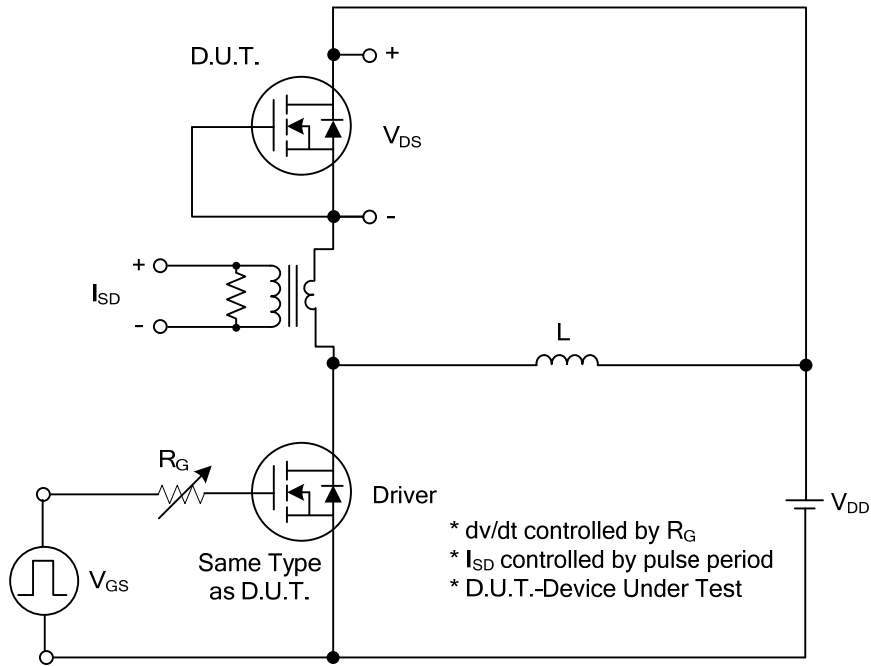
■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =0.25mA, V <sub>GS</sub> =0V	150			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =150V, V <sub>GS</sub> =0V			10	μA
		V <sub>DS</sub> =150V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C			100	μA
Gate-Source Leakage Current	Forward	I <sub>GSS</sub>			100	nA
	Reverse					
					100	nA
		V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V				
<b>ON CHARACTERISTICS (Note 1)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =0.25mA	1.0		2.5	V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =10A			0.13	Ω
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		1100		pF
Output Capacitance	C <sub>OSS</sub>			300		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			60		pF
<b>SWITCHING PARAMETERS (Note 2)</b>						
Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =120V, V <sub>GS</sub> =10V, I <sub>D</sub> =20A I <sub>G</sub> =1mA (Note 1, 2)		39		nC
	Q <sub>GS</sub>			9.4		nC
	Q <sub>GD</sub>			8.0		nC
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =75V, V <sub>GS</sub> =10V, I <sub>D</sub> =20A, R <sub>G</sub> =25Ω (Note 1, 2)		2.8		ns
Rise Time	t <sub>R</sub>			4.5		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			112		ns
Fall-Time	t <sub>F</sub>			35		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>				20	A
Pulsed Drain-Source Current	I <sub>SM</sub>				60	A
Drain-Source Diode Forward Voltage (Note 1)	V <sub>SD</sub>	I <sub>S</sub> =20A, V <sub>GS</sub> =0V			1.5	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>S</sub> =20A, V <sub>GS</sub> =0V, dI <sub>S</sub> /dt=100A/μs		148		ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			0.74		μC

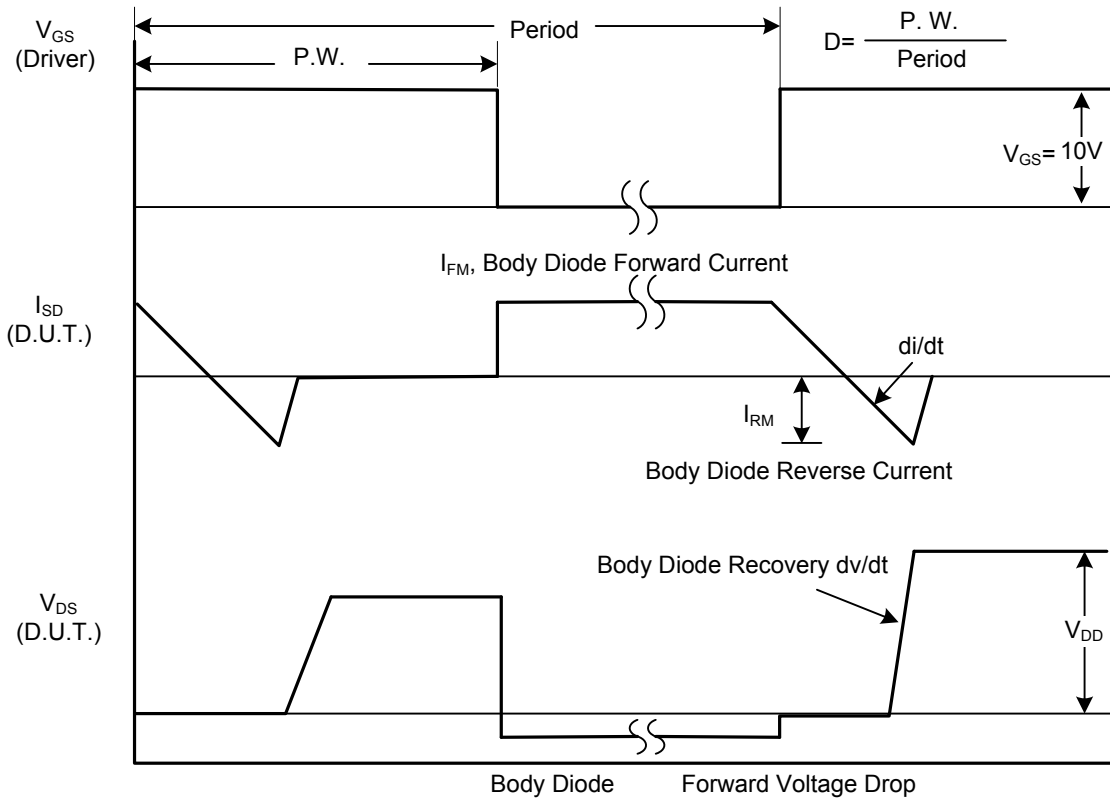
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Switching characteristics are independent of operating junction temperature.

■ TEST CIRCUITS AND WAVEFORMS

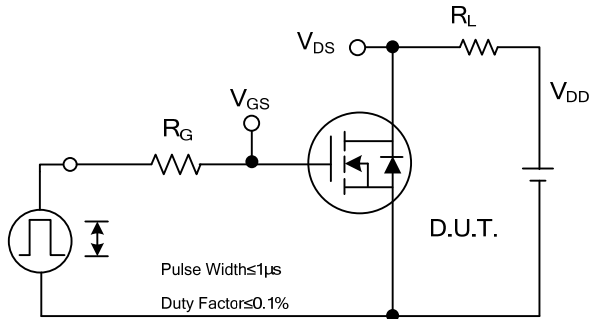


Peak Diode Recovery dv/dt Test Circuit

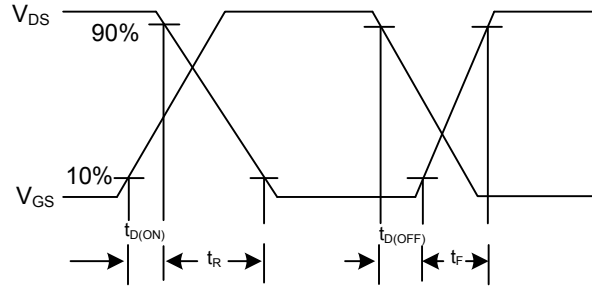


Peak Diode Recovery dv/dt Waveforms

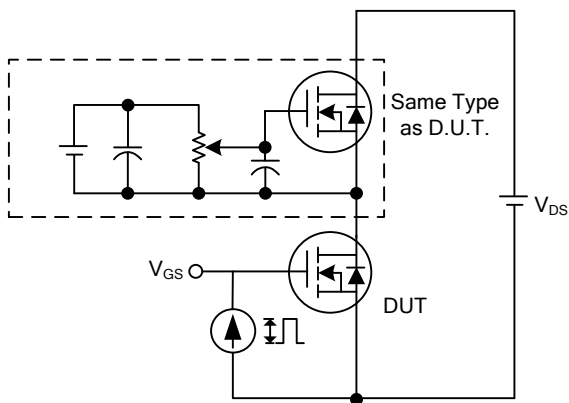
## TEST CIRCUITS AND WAVEFORMS



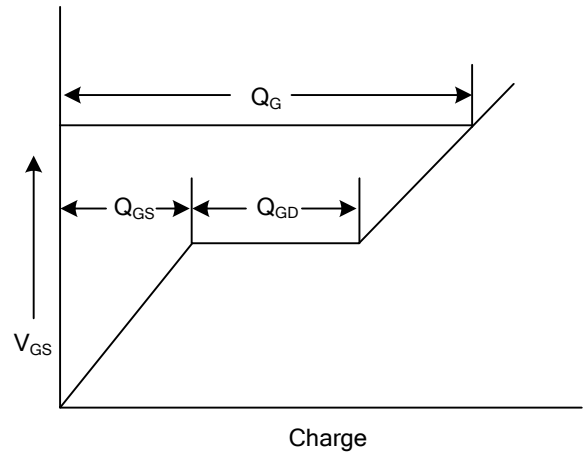
**Switching Test Circuit**



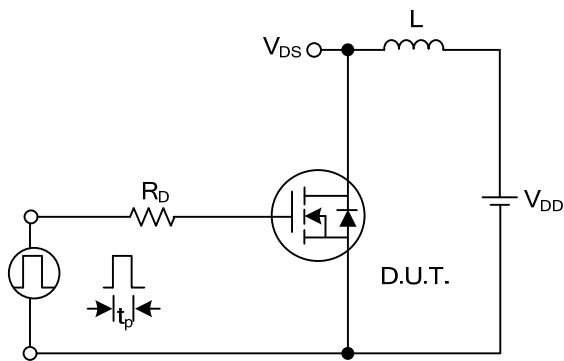
**Switching Waveforms**



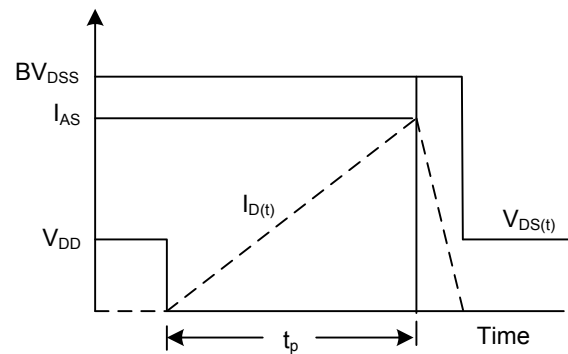
**Gate Charge Test Circuit**



**Gate Charge Waveform**

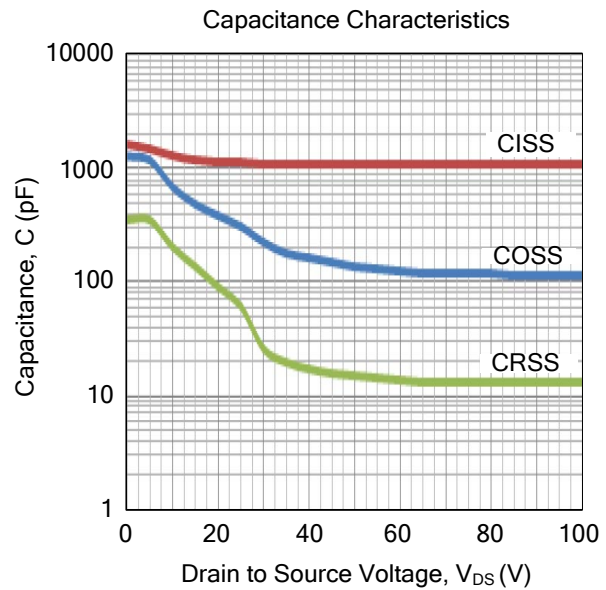
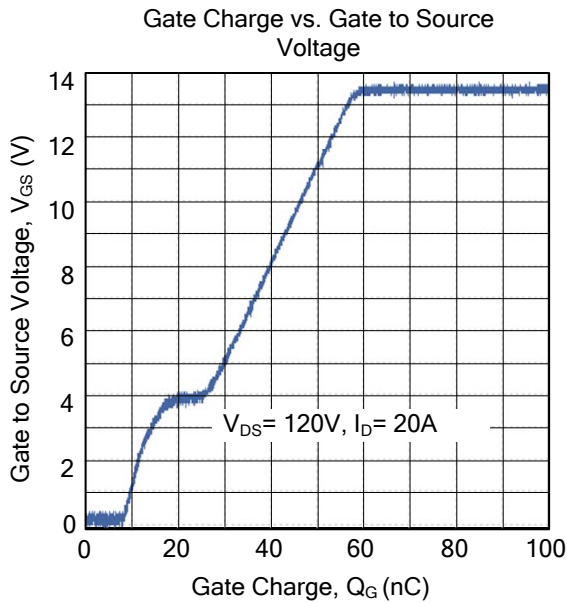


**Unclamped Inductive Switching Test Circuit**



**Unclamped Inductive Switching Waveforms**

## ■ TYPICAL CHARACTERISTICS



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