

**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.

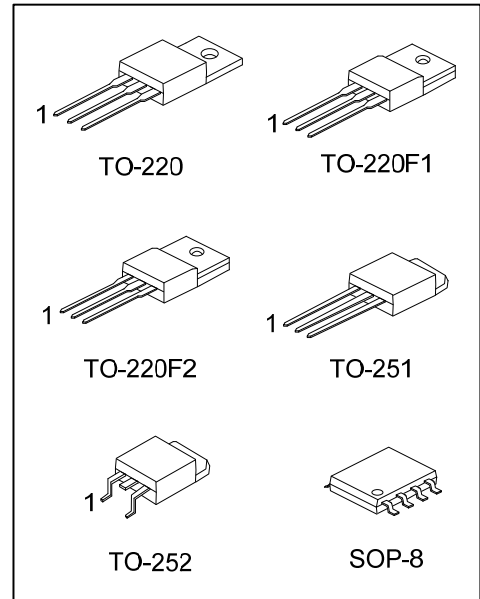
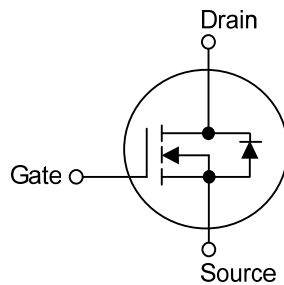
FEATURES

* $R_{DS(on)} \leq 0.13 \Omega$ @ $V_{GS}=10V$, $I_D=10A$

$R_{DS(on)} \leq 2.8 \Omega$ @ $V_{GS}=10V$, $I_D=20A$

* 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-TA3-T	20N15G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
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

20N15G-TA3-T (1) Packing Type (2) Package Type (3) Green Package		(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2, TM3: TO-251, TN3: TO-252, S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING

TO-220 / TO-220F1 / TO-220F2 / TO-251 / TO-252	SOP-8
UTC 20N15 Lot Code 1 L: Lead Free G: Halogen Free Date Code	UTC 20N50 Date Code L: Lead Free G: Halogen Free Lot Code

■ **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 $T_J=25^{\circ}\text{C}$ ($V_{\text{DD}}=120\text{V}$, $V_{\text{GS}}=10\text{V}$, $I_{\text{L}}=20\text{A}$, $L=0.3\text{mH}$)	E_{AS}	60	mJ
Power Dissipation	TO-220	P_{D}	130	W
	TO-220F1/ TO-220F2		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-220/TO-220F1 TO-220F2	θ_{JA}	62.5	$^{\circ}\text{C/W}$
	TO-251/TO-252		110	$^{\circ}\text{C/W}$
	SOP-8		90 (Note)	$^{\circ}\text{C/W}$
Junction to Case	TO-220	θ_{JC}	0.96	$^{\circ}\text{C/W}$
	TO-220F1/ TO-220F2		3.47	$^{\circ}\text{C/W}$
	TO-251/TO-252		2.5 (Note)	$^{\circ}\text{C/W}$
	SOP-8		15.6 (Note)	$^{\circ}\text{C/W}$

Note: Device mounted on FR-4 substrate P_c board, 2oz copper, with 1inch square copper plate.

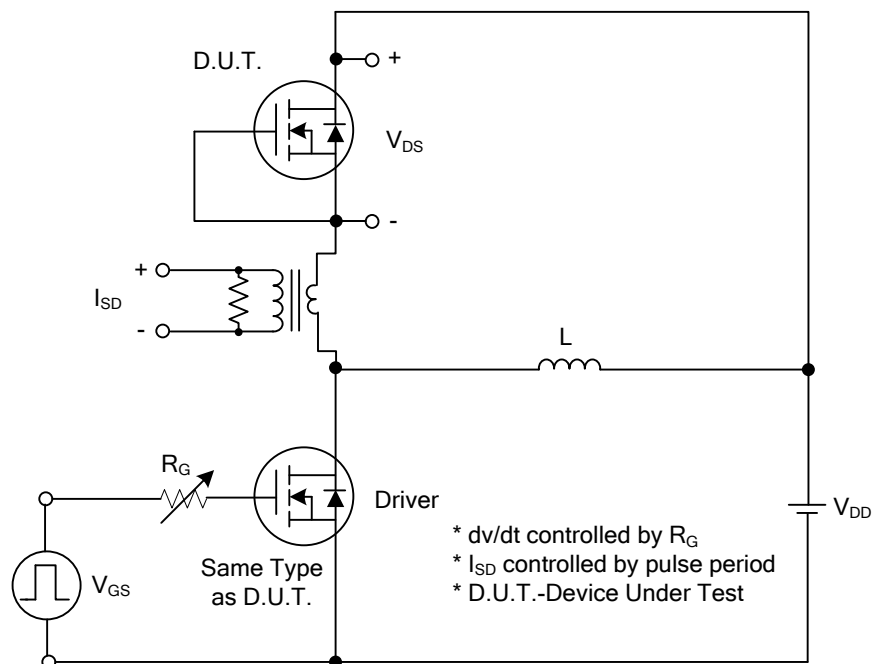
■ ELECTRICAL CHARACTERISTICS ($T_J=25^\circ\text{C}$, unless otherwise noted)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =0.25mA, V _{GS} =0V	150			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =150V, V _{GS} =0V			10	μA
			V _{DS} =150V, V _{GS} =0V, T _J =125°C			100	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 (Note 1)							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =0.25mA	2.0		4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =10A		0.12	0.13	Ω
Drain-Source On-Voltage		V _{DS(ON)}	V _{GS} =10V, I _D =20A			2.8	V
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		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} =10V, V _{DS} =75V, I _D =20A		39.1	55.9	nC	
	Q _{GS}			7.5		nC	
	Q _{GD}			22		nC	
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =75V, V _{GS} =10V, I _D =20A, R _G =9.1Ω		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 =20A, V _{GS} =0V			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 =20A, V _{GS} =0V, dI _S /dt=100A/μs		160		ns
Body Diode Reverse Recovery Charge		Q _{rr}			1.1		μC

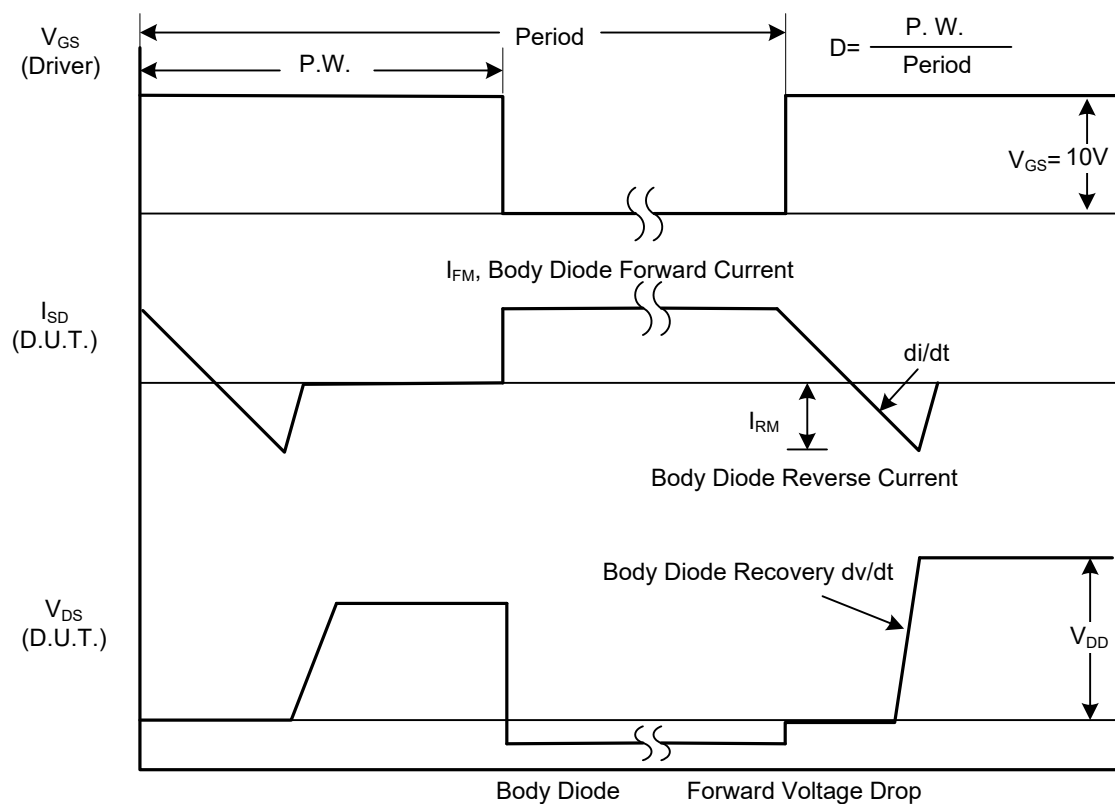
Notes: 1. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

2. Switching characteristics are independent of operating junction temperature.

TEST CIRCUITS AND WAVEFORMS

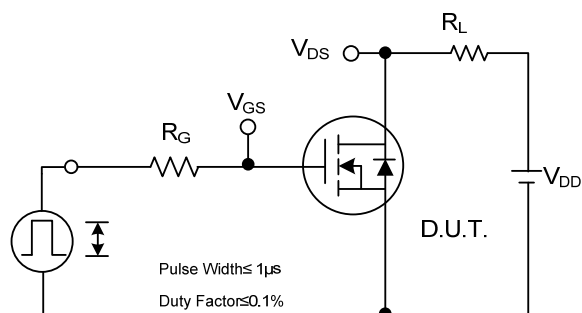


Peak Diode Recovery dv/dt Test Circuit

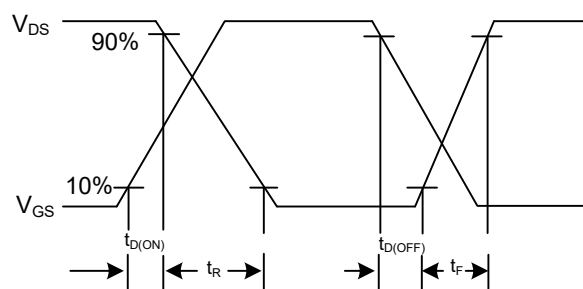


Peak Diode Recovery dv/dt Waveforms

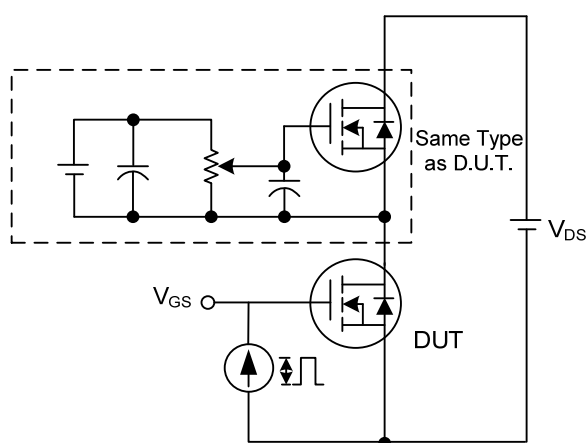
■ TEST CIRCUITS AND WAVEFORMS



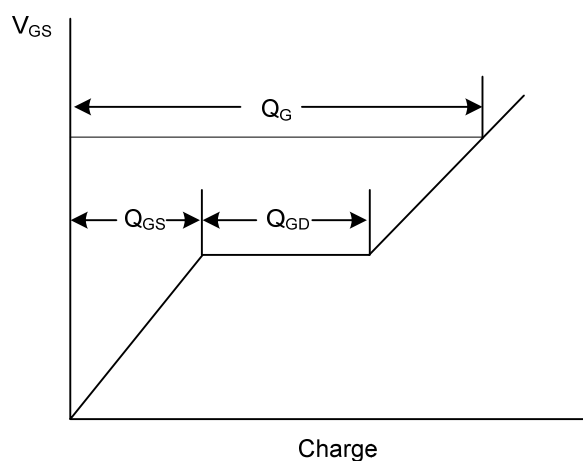
Switching Test Circuit



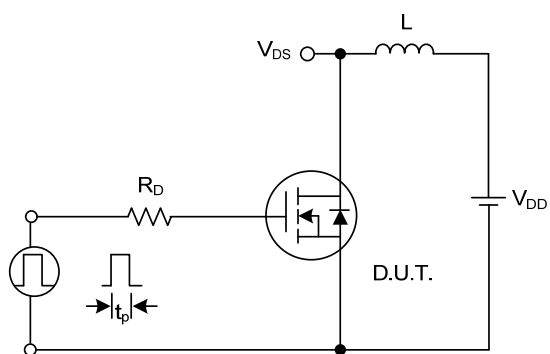
Switching Waveforms



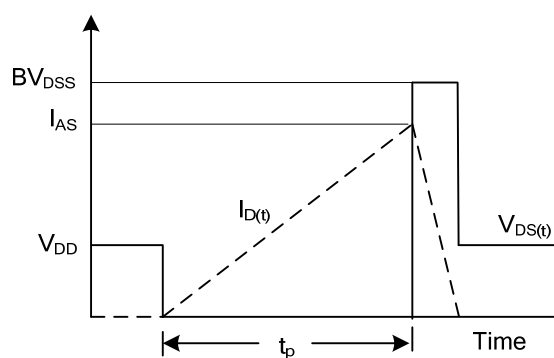
Gate Charge Test Circuit



Gate Charge Waveform

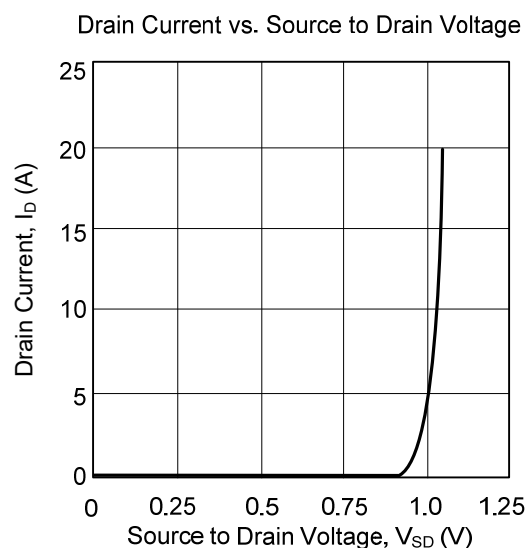
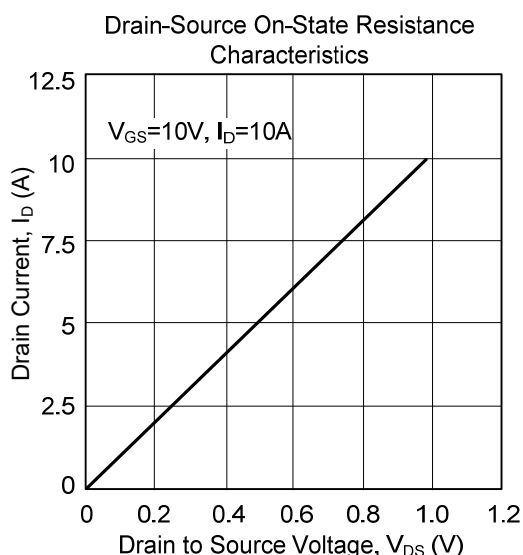
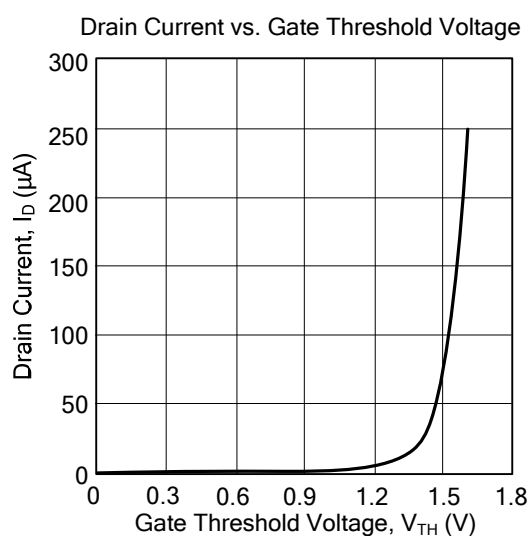
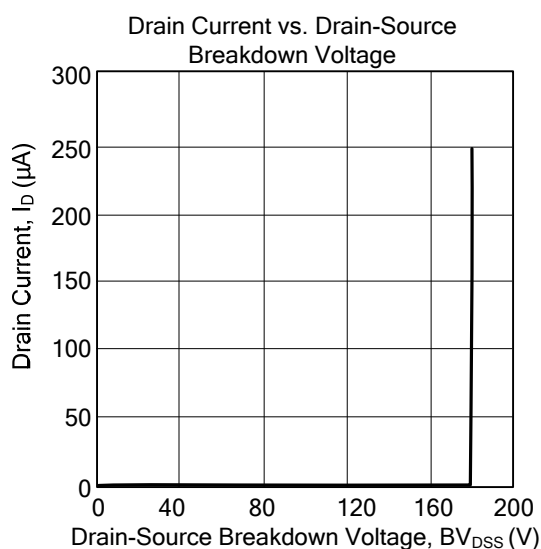


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



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