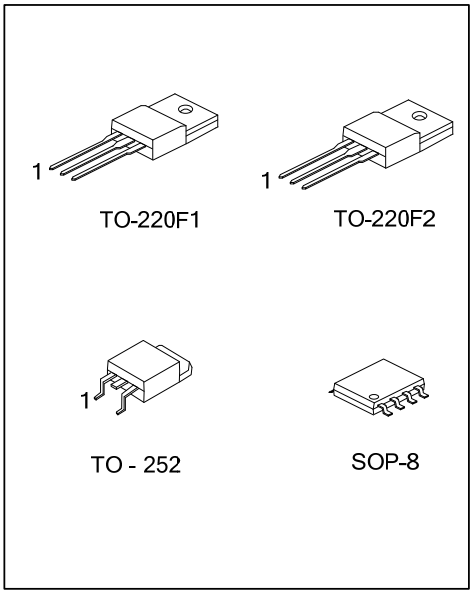
20A, 150V N-CHANNEL POWER MOSFET



■ DESCRIPTION

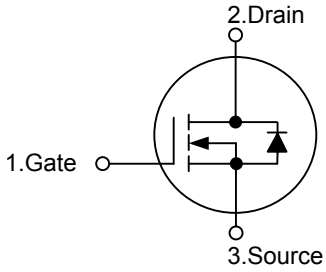
The UTC **20N15** is an N-Channel POWER MOSFET, it uses UTC's advanced technology to provide customers with high switching speed and low gate charge.

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

■ FEATURES

* $R_{DS(on)}$ < 0.13Ω @ V_{GS}=10V, I_D=10A
* High switching speed
* Low gate charge

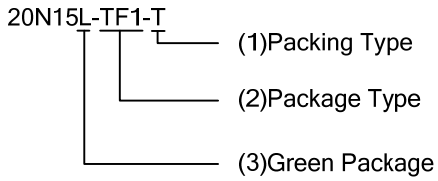
■ SYMBOL



■ 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

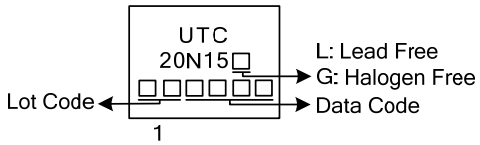
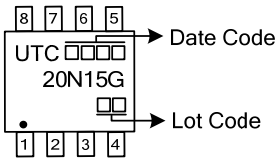


(1) T: Tube, R: Tape Reel

(2) TF1: TO-220F1, TF2: TO-220F2, TN3: TO-252, S08: SOP-8

(3) L: Lead Free, G: Halogen Free and Lead Free

■ MARKING

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

■ ABSOLUTE MAXIMUM RATINGS (T_C=25°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 (tp≤10μs)	I_{DM}	60	A
Single Drain–to–Source Avalanche Energy	Starting T_J=25°C (V_{DD}=120V, V_{GS}=10V, I_L=20A, L=0.3mH)	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	°C
Storage Temperature Range		T_{STG}	-55~+150	°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

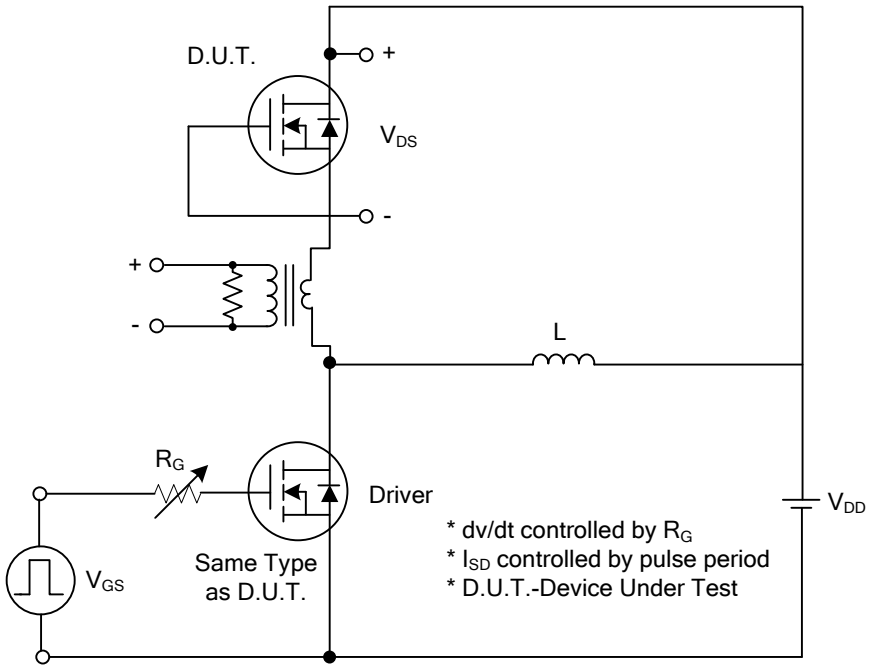
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F1/TO-220F2	θ_{JA}	62.5	°C/W
	TO-252		110	°C/W
	SOP-8		85	°C/W
Junction to Case	TO-220F1	θ_{JC}	3.47	°C/W
	TO-220F2		3.28	°C/W
	TO-252		2.5	°C/W
	SOP-8		12.5	°C/W

■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise noted)

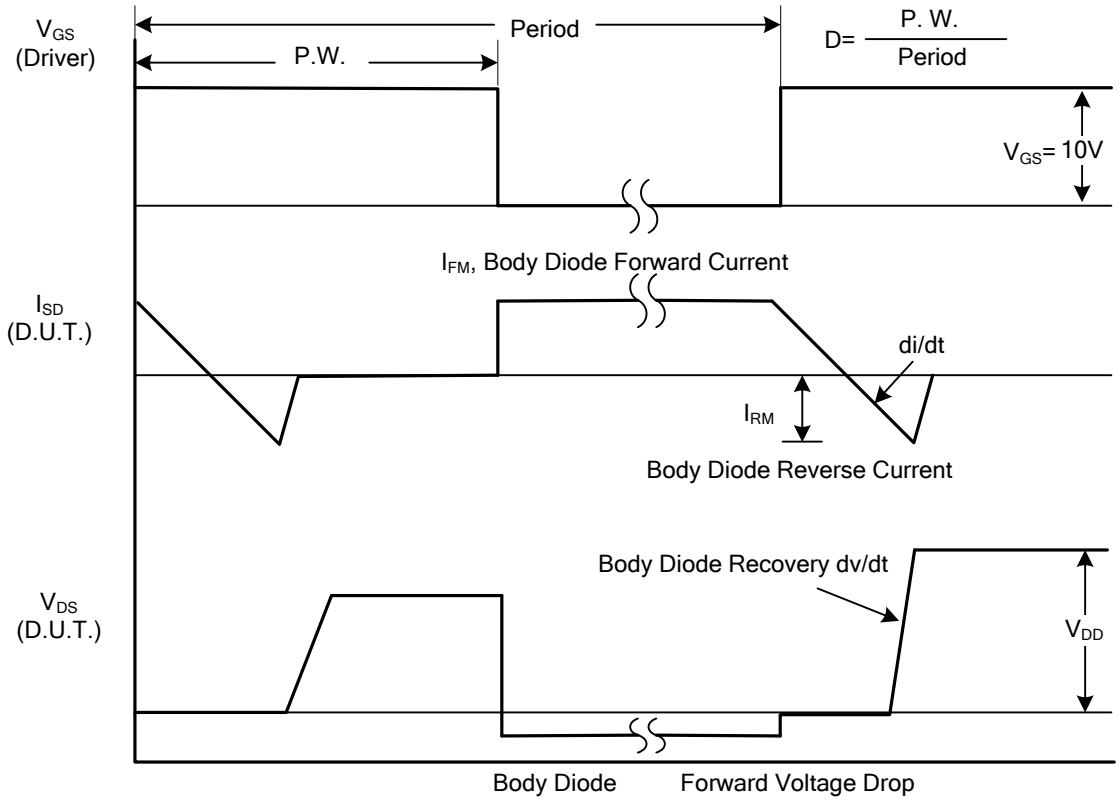
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=0.25mA, V_{GS}=0V	150			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=150V, V_{GS}=0V			10	μA
			V_{DS}=150V, V_{GS}=0V, T_J=125°C			100	μA
Gate-Source Leakage Current	Forward	I_{GSS}	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 ≤ 300μs, Duty Cycle ≤ 2%.
2. Switching characteristics are independent of operating junction temperature.

■ TEST CIRCUITS AND WAVEFORMS

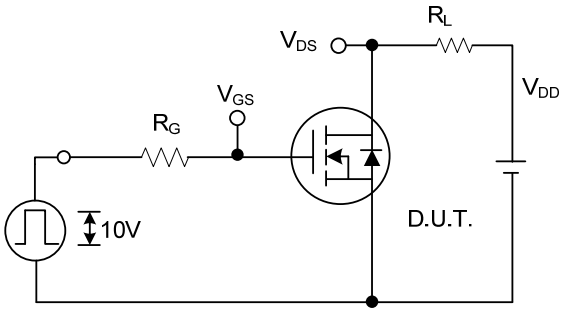


Peak Diode Recovery dv/dt Test Circuit

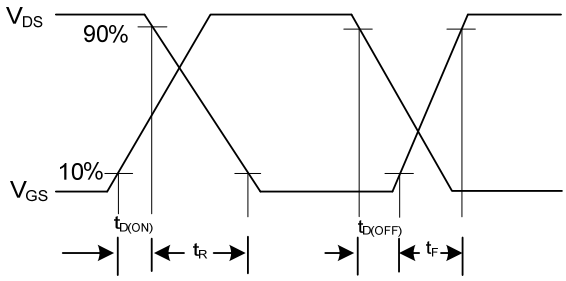


Peak Diode Recovery dv/dt Waveforms

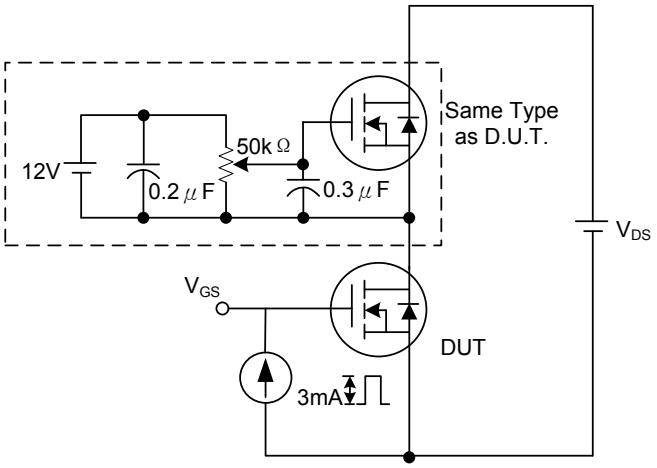
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



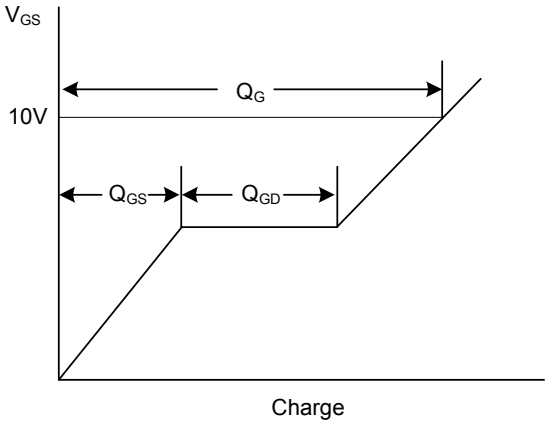
Switching Test Circuit



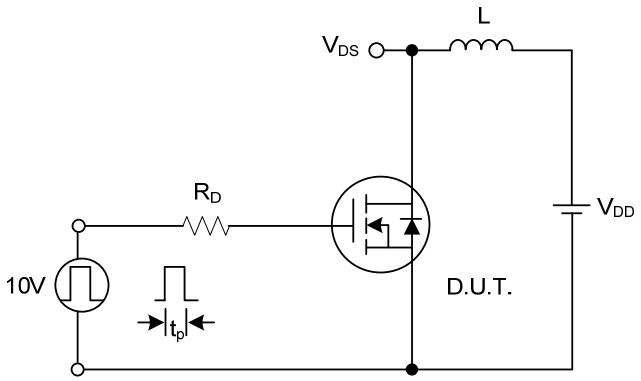
Switching Waveforms



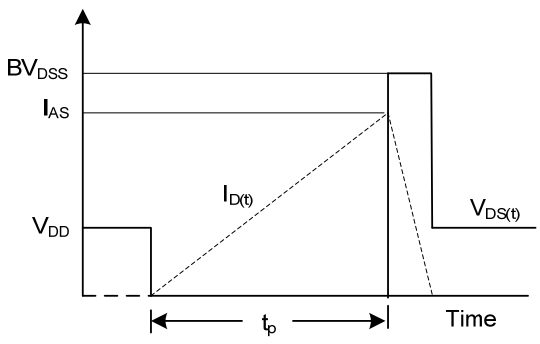
Gate Charge Test Circuit



Gate Charge Waveform



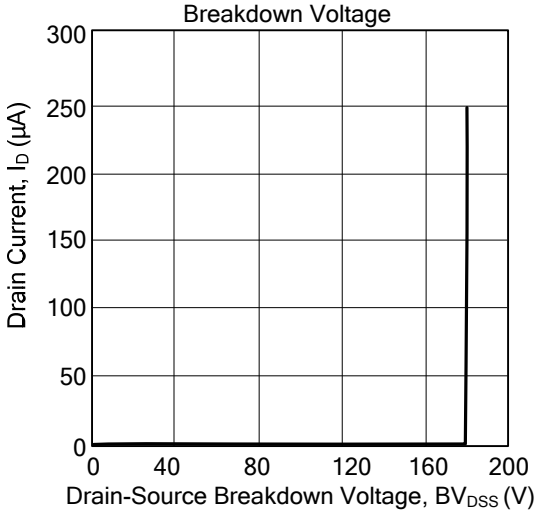
Unclamped Inductive Switching Test Circuit



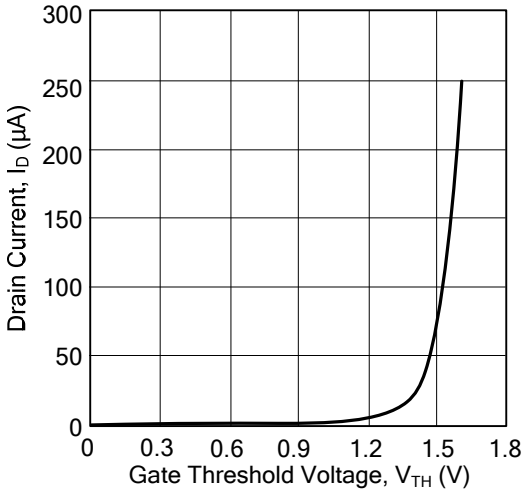
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

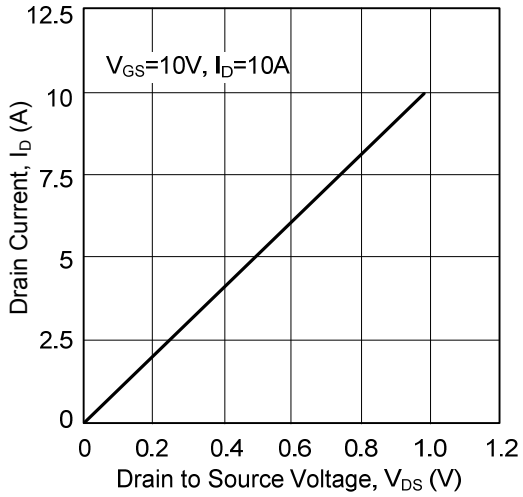
Drain Current vs. Drain-Source Breakdown Voltage



Drain Current vs. Gate Threshold Voltage



Drain-Source On-State Resistance Characteristics



Drain Current vs. Source to Drain Voltage